

TH82

***THERMAL PRINTER
REFERENCE MANUAL***

Version 1.0 MAR.2004



CLOVER Electronics Co., Ltd.



CONTENTS

INTRODUCTION	3
FCC CLASS B	3
DECLARATION OF CONFORMITY	3
SAFETY STANDARDS (Power supply)	3
ABOUT THIS MANUAL	4
1 CHAPTER 1 SET UP	5
1.1 UNPACKING	5
1.2 PRINTER COMPONENTS	5
1.3 ATTACHING INTERFACE CABLE TO THE PRINTER	5
1.4 ATTACHING THE DRAWER, GROUND WIRE AND POWER SUPPLY	6
1.4.1 THE DRAWER	6
1.4.2 GROUND WIRE	6
1.4.3 POWER SUPPLY	6
1.5 SELF TEST	6
2 CHAPTER 2 OPERATION	7
2.1 POWER SWITCH	7
2.2 CONTROL PANEL	7
2.2.1 FEED	7
2.2.2 ONLINE	7
2.3 PANEL LIGHTS	7
2.3.1 POWER LED	7
2.3.2 ONLINE LED	7
2.3.3 ERROR LED	7
3 CHAPTER 3 MAINTERNANCE & TROUBLESHOOTING	8
3.1 INSTALLING OR REPLACING PAPER ROLL	8
3.2 ADJUSTING THE PAPER NEAR END SENSOR	8
3.3 PAPER JAM	9
3.4 TROUBLESHOOTING	9
4 CHAPTER 4 IMPORTANT SAFETY INFORMATION	11
5 CHAPTER 5 SPECIFICATION	12
5.1 PRINTING SPECIFICATION	12
5.2 PAPER SPECIFICATION	13
5.3 INTERFACE SPECIFICATION	13
5.3.1 RS-232 SERIAL INTERFACE SPECIFICATION	13
5.3.2 SERIAL INTERFACE CONNECTION EXAMPLE	13
5.3.3 POWER SUPPLY CONNECTOR	14
5.3.4 DRAWER KICK-OUT CONNECTOR	14
5.4 PACKAGE SPECIFICATION	15
6 CHAPTER 6 COMMANDS	16
6.1 COMMAND TABLE	16
6.2 DESCRIPTION OF THE COMMANDS	18
6.3 DETAILES	18
APPENDIX A DIP SWITCH	67
SETTING & CHECKING THE DIP SWITCHES	67
APPENDIX B FIRMWARE DOWNLOAD	68

INTRODUCTION

FCC CLASS B

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in subpart J of part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try correct the interference by one or more of the following measures:

- reorient the receiving antenna
- relocate the computer with respect to the receiver
- move the computer away from the receiver
- plug the computer into a different outlet so that computer and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communication Commission helpful:

"How to Identify and Resolve Radio-TV Interference Problem."

This booklet is available from the US Government Printing Office,

"Washington, D.C. 20402, Stock No. 004-000-00345-4."

DECLARATION OF CONFORMITY

Declaration of Conformity

Manufacture's name	: Clover Electronics Co., Ltd.
Manufacture's address	: 306-1, Akeno, Obata-Cho, Watarai-gun, MIE, 519-0501, Japan
Product Name	: Thermal Printer
Model Number(s)	: TH-82
Conform to the following standards	
TH-82	: EMC EN50024
	EN55022
	EN61000-3-3
	EN61000-3-2

SAFETY STANDARDS (Power supply)

UL, CUL, TÜV

ABOUT THIS MANUAL

GETTING STARTED

CHAPTER 1 contains information on unpacking the printer and setting it up.
CHAPTER 2 contains information on using the printer.
CHAPTER 3 contains information of maintenance and troubleshooting.
CHAPTER 4 contains security information.

SPECIFICATION

CHAPTER 5 contains printers' specification.
CHAPTER 6 contains character code tables and commands.
APPENDIX A contains information on setting and changing the DIP switches.
APPENDIX B tells how to download the firmware.

NOTE : This guide includes information about following models.

ANK characters with auto cutter	TH-82A
ANK characters without auto cutter	TH-82AN
Japanese and Euro-American model:	TH-82J
Above model without auto cutter:	TH-82JN
*Chinese and Euro-American model:	TH-82C
Above model without auto cutter:	TH-82CN
Korean and Euro-American model:	TH-82K
Above model without auto cutter:	TH-82KN

*Note Chinese model merchandising was not fixed under the influence of Chinese domestic law as of Jan, 2004. For further information, please contact us.

SAFETY DEFINITIONS

In order to avoid hazards to a user or other persons and damage to the product, be sure to observe the following instructions

For the safety of the personnel and the product, operate the equipment according to the instructions in this user's guide. The manufacturer will not be responsible for any problems or damage that arises from improper use.



WARNING : Warning may result in death or serious injury.



CAUTION : Caution may result in injury or damage to property.

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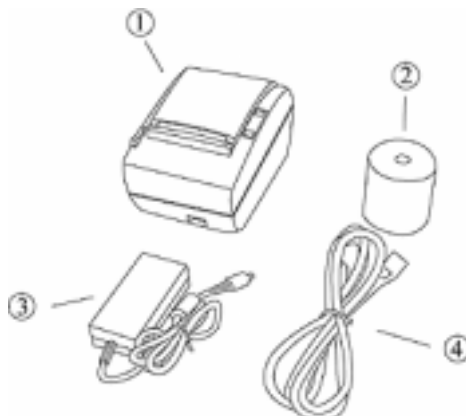
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1 CHAPTER 1 SET UP

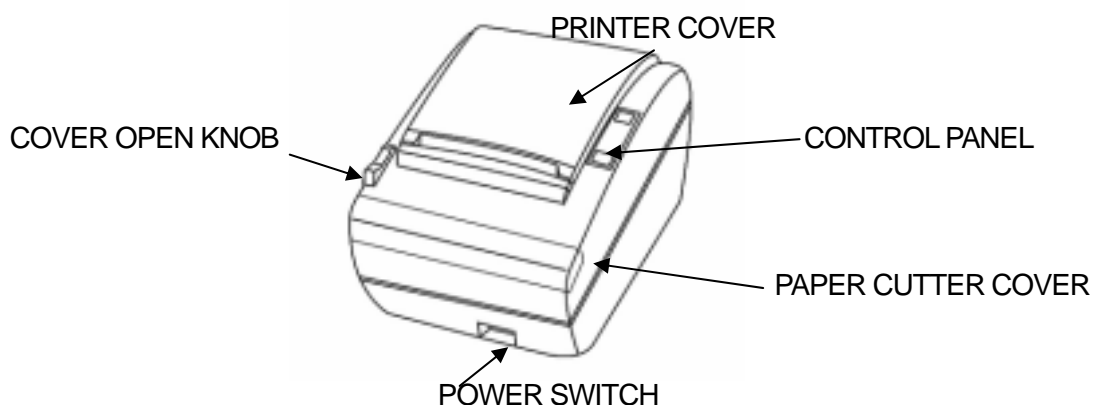
1.1 UNPACKING

Check for the following items in your box.

- ① thermal printer
- ② roll paper
- ③ AC adapter
- ④ AC cord



1.2 PRINTER COMPONENTS

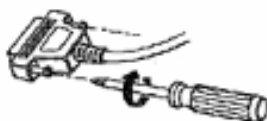


Before connecting any of the cables, please turn off the HOST device.

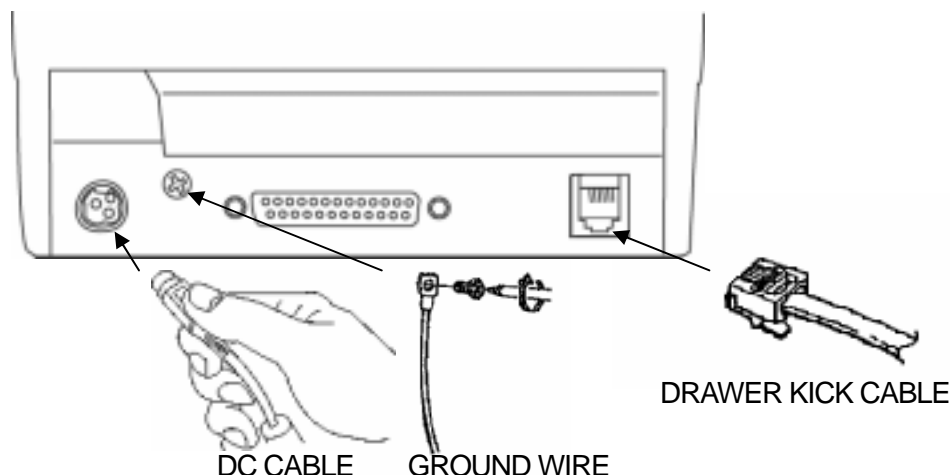
1.3 ATTACHING INTERFACE CABLE TO THE PRINTER

You need an appropriate interface cable. Refer to section 5.3.1 on page 13 for cable details.

- 1: Plug the cable into the interface connector located on the back of the printer, as indicated below.
- 2: Firmly tighten the screws on both sides of the connector.
- 3: Attach the other end of the cable to the HOST.



1.4 ATTACHING THE DRAWER, GROUND WIRE AND POWER SUPPLY



1.4.1 THE DRAWER

CAUTION : *You need a drawer that fits the printer's specification.*

Do not connect a telephone line to the drawer kick-out connector.

Plug the drawer kick cable into the kick-out connector. If two drawers are used, use a Y-cable that meets the specifications on page 14 to ensure that both drawers receive signals correctly.

1.4.2 GROUND WIRE

Use a ground wire that matches your printer. It is recommended to use a ground wire that is at least the same length as the power cable. Connect the ground wire to the back of the printer with the supplied screw as shown above.



1.4.3 POWER SUPPLY

CAUTION : *Before connecting or disconnecting the power supply to the printer, make sure that the power supply is unplugged from the power outlet and connect the power cord into the adapter.*

1: Make sure that the adapter plug is unplugged from the power outlet.

2: Plug the DC cable into power connector with the flat side of the plug turned up.



CAUTION : *When disconnecting the adapter, turn the printer off and the DC cable out by gripping the plug. Do not pull it out by the cord.*

1.5 SELF TEST

Use the self test to check that your printer is operating properly. It checks the control circuits, printer mechanisms, print quality, and displays the firmware version and DIP switch settings.

1 : Make sure that the printer cover is closed properly and turn the power off.

2 : While holding down the FEED button, turn the printer on and continue holding down the FEED button until the self test starts.

3 : The self test will end automatically and detach the self test print out.

NOTE : Refer to **CHAPTER 3, MAINTENANCE & TROUBLESHOOTING** about how to install and replace the paper roll.

2 CHAPTER 2 OPERATION

Use the indicator's lights to monitor the printing status.

2.1 POWER SWITCH

Turn the printer ON or OFF.

2.2 CONTROL PANEL

2.2.1 FEED

Press the FEED button to advance the paper by one line. Hold down the FEED button to advance paper continuously.

2.2.2 ONLINE

Press the ONLINE button to put the printer online or offline. The green light indicates the printer is online. Pressing the online button during printing will pause printing until the online button is pressed again.

2.3 PANEL LIGHTS

2.3.1 POWER LED

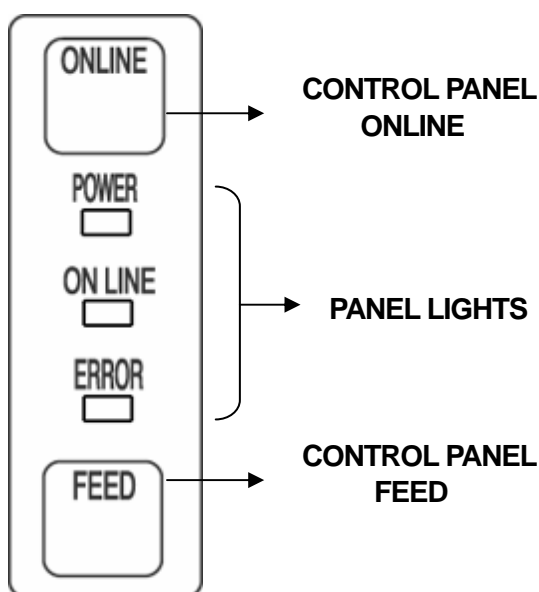
This lights up whenever the printer is on.

2.3.2 ONLINE LED

This lights up when the printer is in online.

2.3.3 ERROR LED

This indicates an error. Refer to page 9, **TROUBLESHOOTING** about any action for ERROR LED.



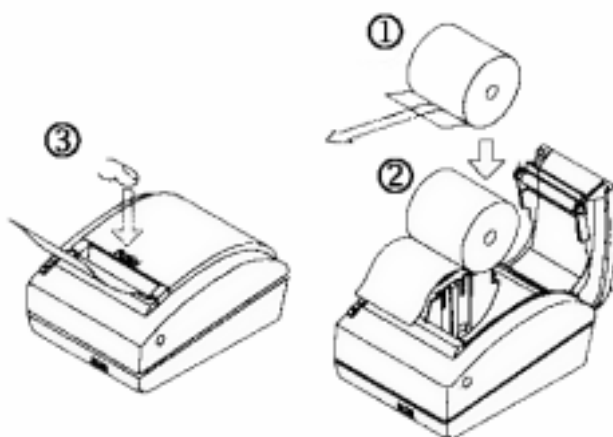
3 CHAPTER 3 MAINTENANCE & TROUBLESHOOTING



3.1 INSTALLING OR REPLACING PAPER ROLL

CAUTION : *make sure that paper rolls meets printer's specification. Do not use paper rolls that have one end glued to the core. This causes excessive load on the paper feed.*

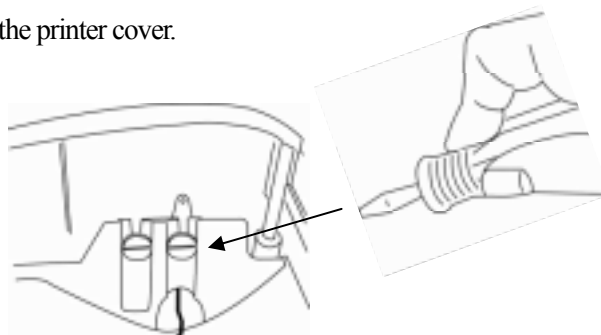
- 1 : Make sure that the printer is not printing or receiving data, and open the printer cover by pressing the cover open knob. Unroll several inches of the paper as shown.
- 2 : Insert the paper roll as shown.
- 3 : Pull out several inches of paper and close the printer cover as shown.
Tear off the excess paper on the cutter edge.



3.2 ADJUSTING THE PAPER NEAR END SENSOR

A sensor detects when the paper roll is running out. Due to variation in the width of paper roll cores, it is difficult to measure the exact length of the paper left on the roll when the detector is triggered. The factory setting is based on a paper roll core with an outside diameter of 18mm and an inside diameter of 12mm. If you use a paper roll with different widths, adjust the setting as described below.

- 1: Open the printer cover and remove the paper roll.
- 2: Loosen the adjusting screw and move the tab to fit the core of the paper roll.
- 3: Tighten the adjusting screw.
- 4: Replace the paper roll and close the printer cover.



3.3 PAPER JAM



CAUTION : *Do not touch the printer head because they are very hot after continuous printing. Do not attempt to clear a paper jam until the printer cools down.*

1 : Turn the printer off and press the cover open button.

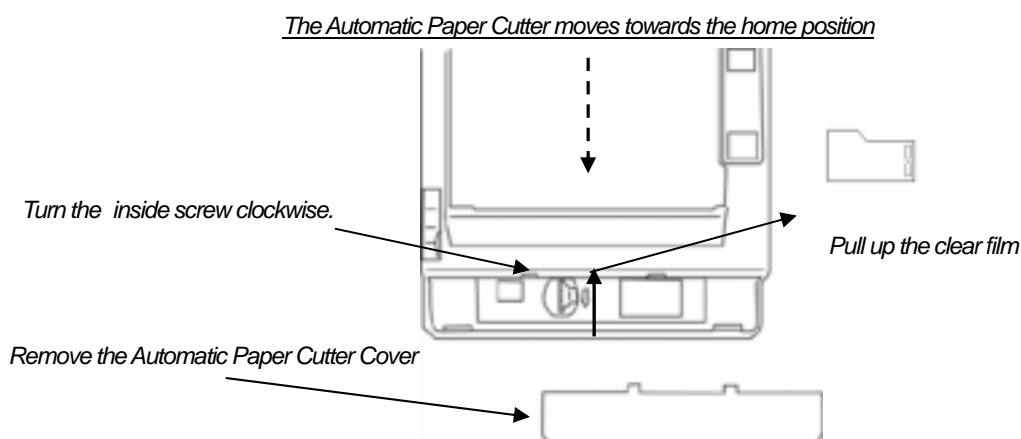
2 : Remove the jammed paper and replace the paper roll.

If the printer cover can't be opened after a paper jam, check the Automatic Paper Cutter.

1 : Remove the Automatic Paper Cutter Cover.

2 : Pull up the clear film, and slowly turn the screw inside clockwise until the cutter edge reaches home position, see below.

3 : Now, the printer cover should open easily. Remove the paper jam and replace the paper roll.



3.4 TROUBLESHOOTING

Error Contents	Causes/point to check	Solutions
Can't turn the printer ON	Is the Power Switch turned ON?	Turn the Power Switch ON
	Is the connector on the power adapter properly connected?	Connect the Connector firmly
	Does the Printer reset when you turn the Power Switch ON?	If it does, something is wrong with the Operation Panel. Call for SERVICE※
	Does the LED on the Adapter light up when connected to the wall?	If it doesn't, check the connection of the Power Supply Cord. If the connection is OK, something is wrong with the Adapter. Call for SERVICE※
	Other	Something may be wrong with the Power Switch Parts or with the Main Board. Call for SERVICE※
ON LINE Indicator doesn't light up	Is the ERROR Indicator ON?	If it is, see "ERROR Indicator is ON"
	Press the ON LINE Button	If ON LINE Indicator turns on, it's normal
ERROR Indicator is ON	Check if the printer is out of paper	If paper is out, replace with a new roll
	The Cover doesn't open even if you press the Cover Open Button	The Automatic Paper Cutter may be locked. See Chapter 7, "Paper Jam".

Error Contents	Check/points to check	Solutions
ERROR Indicator is ON	The Printer Cover doesn't close completely	Open the Cover by pressing the Cover Open Button, and Close it again by pushing at center of
ERROR Indicator doesn't light up when out of paper. (The Printer Cover is closed)	ON LINE Indicator lights up after pushing the ON LINE Button	Something is wrong with Paper Sensor on the MAIN Board inside the Printer
	Other	Something is wrong with the Operating Panel. Call for SERVICE※
ERROR Indicator doesn't light up while the Printer Cover is open	ONLINE Indicator lights up and off after pushing the ON LINE button.	Something is wrong with Paper Sensor of the MAIN Board inside the Printer
	Other	Something is wrong with the Operating Panel
Can't print the self test	ONLINE Indicator is not ON	See "ON LINE Indicator doesn't light up
	Printing causes the paper to feed	Something is wrong internally or with the Printer Head. Call for SERVICE※
Printing cannot be done by the commands from the HOST or peinting gabled.	Check print capability by running the Self-Test	If printing fails, see "Can't Print"
	Is the Connector of Interface firmly connected with screws?	Seat the Connector firmly and tighten the screws
	Check the setting of DIP Switch	Refer APPENDIX A and set the switches correctly, then power cycle the printer
Drawer Kick doesn't work	Is the drawer kick connected properly?	Re-plug in the cable. You should hear or feel a click if the proper connection is made.
	Is the Y-cable connected reverse order?	Check the Y-cable and verify it is connected in the correct order.
	Other	Something may be wrong with the MAIN Board inside the Printer. Call for SERVICE※
ERROR Indication and ON LINE Indication flash on and off alternately	Check the setting of DIP Switch	Refer to APPENDIX A. Turn the printer off, make any necessary changes, then turn the printer on.

※"SERVICE CALL" Do not attempt to repair problems requiring SERVICE CALL. It can be dangerous to your health and or cause additional damage to the product. Entries requiring SERVICE CALL are hardware failures and require repair by qualified service personnel.

4 CHAPTER 4 IMPORTANT SAFETY INFORMATION

- Read all the direction and keep this manual for future use.
- Follow all of the warnings and instructions marked on the product and in this manual.
- Unplug this product from the wall outlet before cleaning. Do not use liquid or aerosol cleaners.
- Do not use this product near water.
- Do not place this product on an unstable cart, stand or table. The product could fall, causing serious damage to the product and bystanders.
- Slots and openings on the back or bottom of the case are provided for ventilation. To ensure reliable operation of the product and to protect it from overheating, do not block or cover these openings. The openings should not be placed near or over a radiator or heater. This product should not be placed in a built-in installation unless proper ventilation is provided.
- This product should be operated from the type of power source indicated on the marking label. If you are not sure of the type of power available, consult your dealer or local power company.
- Do not place this product where the cord will be walked on.
- If an extension cord is used with this product, make sure that the total of the ampere rating of the products plugged into the extension cord does not exceed the extension cord ampere rating. Also, make sure that the total of all products plugged into the wall outlet does not exceed 15 amperes.
- Do not push objects of any kind into this product through cabinet slots as they may touch dangerous voltage points or short out parts that could result in a risk of fire or electric shock. Do not spill liquid of any kind on the product.
- Except as specifically explained in this manual, do not attempt to service this product by yourself. Opening and removing the covers that are marked “Do Not Remove” may expose you to dangerous voltage or other risks. Refer all servicing in these compartments to qualified service personnel.
- Unplug this product from the wall outlet and contact qualified service personnel after any of the following events:
 - ☐ The power cord or plug is damaged or frayed.
 - ☐ Liquid has been spilled into the product.
 - ☐ The product has been exposed to rain or water.
 - ☐ The product does not operate normally when the operating instructions are followed. Adjust only those controls that are covered by the operating instructions since improper adjustment of other controls may result in damage and will often require service by a qualified technician to restore the product to normal operation.
 - ☐ The product has been dropped or the cabinet has been damaged.
 - ☐ The product exhibits a distinct change in performance, indicating a need for service.
- Keep the poly bag which this equipment came packed in away from children, and or dispose of it safely to prevent children from putting it on. Putting it on can cause suffocation.


5 CHAPTER 5 SPECIFICATION

5.1 PRINTING SPECIFICATION

TYPE	TH-82		TH-200, TH-200s	
Model NO. of Printer Mechanism	LTPE347B-C576 ※1		LTPF347A-C576 ※1	
Printing Method	Direct Line Thermal		Direct Line Thermal	
Dot pitch	8 dot/mm		8 dot/mm	
Printing Speed	75 mm per second (Max.)		210 mm per second (Max.)	
Printing width	72 mm / 576 dots		72mm / 576 dots	
Character structure	8 x 16 (font B)	12 x 24 (font A)	8 x 16 (font B)	12 x 24 (font A)
Printing Columns	69 columns/line	46 columns/line	69 columns/line	46 columns/line
Character Size	1.00 x 2.00	1.50 x 3.00	1.00 x 2.00	1.50 x 3.00
Fonts	US-ASCII, international characters		US-ASCII, Katakana, international characters	
Kanji 2	Japanese / Chinese (GB2312-80) / Korea (KS C 5601-1989) 2		Japanese/Chinese(GB2312-80) / Korea (KS C 5601-1989) 2	
Interface	RS232C (serial)		RS232C (serial)	
Input buffer	8K bytes		8k bytes	
Command	ESC/POS compliant		ESC/POS compliant	
Paper Width & Diameter	80mm(W) x 80mm Dia. Max.		80mm(W) x 80mm Dia. Max.	
Thermal head life	100 Million Pulses / 100km or more		100 Million Pulses / 100 km or more	
Cutting method ※3	ACUF324A Partial cut(one point left uncut) ※3		ACUF324A Partial cut(one point left uncut) ※3	
Auto cutter life	500,000 cuts		500,000 cuts	
Operating time of auto cutter	600msec max/cycle		600msec max/cycle	
Operating temperature	0 °C ~ 40 °C		0 °C ~ 40 °C	
Storage temperature	-20 °C ~ 50 °C		-20 °C ~ 50 °C	
Humidity	80%		80%	
Dimension	145mm(W) x 193.2mm(L) x 120.1mm(H)		145mm(W) x 193.2mm(L) x 120.1mm(H)	
Transfer speed	Max 19.2kBps		Max 38.4kBps	
Supply voltage in standby	24V DC		24V DC	
Weight	1.1kg		1.1kg	
Barcode Alignment	○		○	
Case color	Ivory or black		Ivory or black	

1 Manufactured by SIIP&S Inc. (Former name: Seiko Instruments Inc.)

2 Japanese, Chinese and Korea Kanji ability is model specific. Refer to page 4, **ABOUT THIS MANUAL** or your dealer for more information on the different models and Kanji ability.

※3  **CAUTION:** Paper must be fed 3 mm after cutting to prevent paper jam.

5.2 PAPER SPECIFICATION

Paper Width:	79.5±0.5mm(3.13±0.02”)		
Paper roll size:	Roll diameter:	Maximum 80mm (3.15”)	
	Take-up paper roll width:	80 +0.5/-1.0mm (3.15+0.02/-0.04”)	
Specified paper:	Specified thermal roll paper:		
	NTP080-80		
	[Original paper: TF50KS-E2C Nippon Paper Industries Co., Ltd.]		
	Packaged roll paper:		
	[Original paper: PD160R-N (Oji Paper Mfg. Co., Ltd.)]		
	In Japan: Nakagawa Manufacturing Co., Ltd.		
	In U.S.A: Nakagawa Mfg. (U.S.A.) Inc.		
	In Europe: Nakagawa Mfg. (Europe) GmbH		
	In Southeast Asia: N.A.K. Mfg. (Malaysia) SDN BHD		
	*The following paper can be used instead of the paper above:		
	Original paper: HP220AB1 (Mitsubishi Paper Mills Ltd.)		
Paper roll spool diameter:	Inside	12 mm (0.47”)	
	Outside	18 mm (0.71”)	

NOTE: The end of the paper roll must be free to come off the spool when finished. It must not be adhesively attached or attached in another semi-permanent manner.

5.3 INTERFACE SPECIFICATION

5.3.1 RS-232 SERIAL INTERFACE SPECIFICATION

Data transmission:	Serial
Synchronization:	Asynchronous
Handshaking:	DTR/DSR or XON/XOFF control
Signal levels:	MARK = -3 to -15V: Logic "1"/OFF
	SPACE = +3 to +15V: Logic "0"/ON
Baud rate:	9600, 19200bps
Data word length:	7 or 8 bits
Parity Settings:	None, even, odd
Stop bits:	1 or more
Connector (printer side):	Female DSUB-25 pin connector

NOTE: *The data word length, baud length, and parity depend on the DIP switch settings. (Refer to **Appendix A DIP SWITCH SETTING**.)

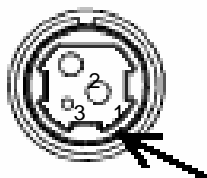
5.3.2 SERIAL INTERFACE CONNECTION EXAMPLE

HOST SIDE		PRINTER SIDE	
(DTE ex.8251)			Pin No.
TXD	-----	RXD	3
DSR	-----	DTR	20
CTS	---	RTS	4
RTS	---		
RXD	-----	TXD	2
DTR	-----	DSR	6
FG	-----	FG	1
SG	-----	SG	7

5.3.3 POWER SUPPLY CONNECTOR

The connector is connected the printer to an external power source.

PIN	SIGNAL
1	+24V
2	GND
3	NC
SHELL	F.G



SHELL

CONNECTOR MODEL:

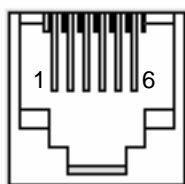
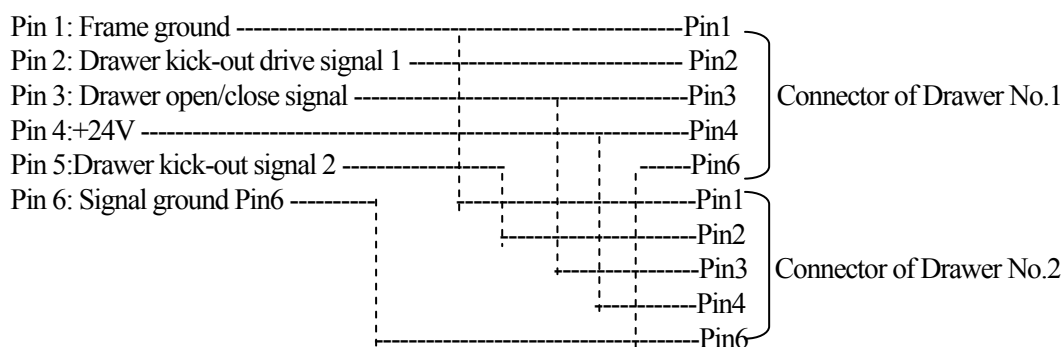
Printer side: Hosiden TCS7960-532010 or equivalent
 User side: Hosiden TCP8927-631100 or equivalent
 Hosiden TCP8927-531100 or equivalent

5.3.4 DRAWER KICK-OUT CONNECTOR

The pulse specified by **ESC p** or **DLE DC4** is output to this connector. The HOST can confirm the status of the input signal by using the **DLE EOT**, **GS a**, or **GS r** commands.

PIN	I/O	DESCRIPTION
1	-	Frame ground
2	Output	Drawer kick-out drive signal 1
3	Input	Drawer open/close signal
4	Output	+24 V
5	Output	Drawer kick-out signal 2 ※
6	-	Signal ground

※Two drawers can be used with a Y-cable that meets the following specifications.



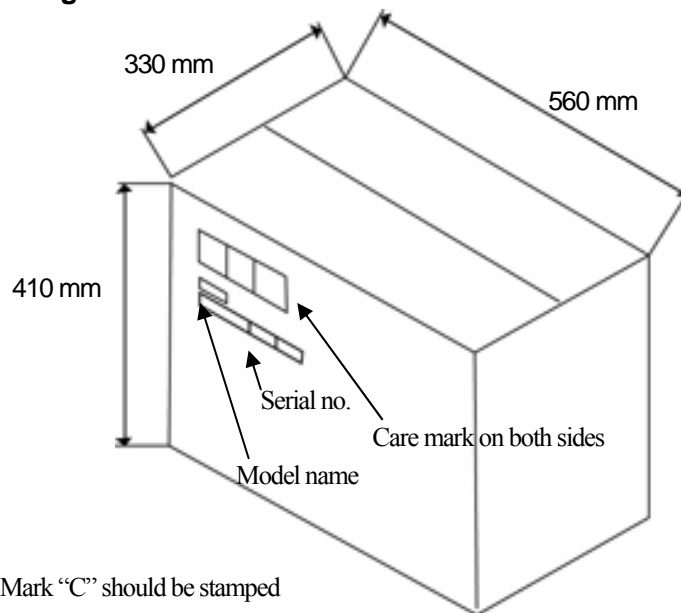
CONNECTOR MODEL:

Printer side: MOLEX52065-6615 or equivalent
 Used side: 6-position 6-contact (RJ12 telephone jack)

5.4 PACKAGE SPECIFICATION

OUTER CASE

Weight: 10.5 Kg

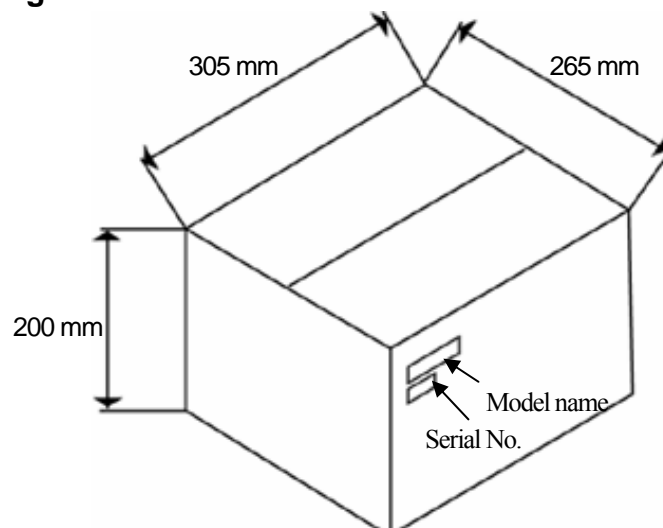


ENCLOSED GOODS:
DISPLAY

INNER CASE: 4pcs
CARE MARK, MODEL NAME: stamped in 2 parts (both sides)
SERIAL NO stickers attached: 4pcs
SEALING TAPE: OPP, clear color, "H" shaped taping

INNER CASE

Weight: 2.4kg



ENCLOSED GOODS :
DISPLAY:

PRINTER, PAPER ROLL, GEATTING STARTED GUIDE
MODEL NAME: stamped in 2 parts (both sides)
SERIAL NO sticker attached: 1 part
SEALING TAPE: OPP, clear color, "I" shaped taping

6 CHAPTER 6 COMMANDS

6.1 COMMAND TABLE

COMMAND	NAME	TH-82	TH-200	COMMAND		STANDARD MODE	PAGE MODE
				EXECUTING	SETTING		
HT	Horizontal tab	○	○	○		○	○
FF	Print in page mode and return to standard mode	○	○	○		—	○
CR	Carriage return	○**		○		○	○
LF	Print and line feed	○	○	○		○	○
DLE NUL	Clear			○		○	○
DLE ENQ	Real-time request to printer	○	○	○		○	○
DLE DC4	Real-time pulse output	○	○	○		○	○
DLE EOT	Real-time status transmission	○	○	○		○	○
CAN	Cancel print data	○	○	○		—	○
ESC FF	Print data in page mode	○	○	○		—	○
ESC SP	Set the right space amount of the character	○**	○		○	○	○
ESC !	Select print mode	○	○		○	○	○
ESC \$	Set absolute print position	○**	○	○		○	○
ESC %	Specify/cancel download character set	○	○		○	○	○
ESC &	Define download characters	○	○		○	○	○
ESC *	Specify the bit-image mode	○	○	○		○	○
ESC -	Turn underline mode on/off	○	○		○	○	○
ESC 2	Specify 1/6-inch line spacing	○	○		○	○	○
ESC 3	Set line spacing	○**	○		○	○	○
ESC 4	Set logo pattern data				○	○	○
ESC =	Set peripheral device	○	○		○	○	○
ESC ?	Cancel download characters	○	○		○	○	○
ESC @	Initialize printer	○	○	○	○	○	○
ESC D	Set horizontal tab positions	○	○		○	○	○
ESC E	Turn emphasized mode on/off	○	○		○	○	○
ESC G	Turn double-strike mode on/off	○	○		○	○	○
ESC J	Print and feed paper	○**	○	○		○	○
ESC L	Select page mode	○	○	○		(Line)	—
ESC M	Select character font	○	○		○	○	○
ESC R	Select an international character set	○	○		○	○	○
ESC S	Select standard mode	○	○	○		—	○
ESC T	Select print direction in page mode	○	○		○	(Set)	○
ESC V	Turn 90° clockwise rotation mode on/off	○	○		○	○	(Set)
ESC W	Set printing area in page mode	○**	○		○	(Set)	○
ESC \	Set relative print position	○**	○	○		○	○
ESC a	Select justification	○	○		○	(Line)	(Set)
ESC c3	Select effective paper sensors	○	○		○	○	○
ESC c4	Select paper sensor to stop printing	○	○		○	○	○
ESC c5	Enable/disable panel switches	○	○		○	○	○
ESC d	Print and feed n lines	○	○	○		○	○
ESC i	Full cut	○	○	○		(Line)	
ESC k	Select characters (ANK)				○	○	○
ESC m	Partial cut	○	○	○		(Line)	○
ESC o	Print logo pattern			○		○	—
ESC p	Generate pulse	○	○	○		○	○
ESC t	Select character code table	○	○		○	○	○

COMMAND	NAME	TH-82	TH-200	COMMAND		STANDARD MODE	PAGE MODE
				EXECUTING	SETTING		
ESC u	Transmit drawer status			○		○	○
ESC {	Turn upside-down printing mode on/off	○	○		○	(Line)	(Set)
ESC ~	Specify print density	○	○		○	○	○
FS g1	Write to NV user memory	○			○	○	—
FS g2	Read to NV user memory	○		○		○	○
FS p	Print NV bit image	○	○	○		○	—
FS q	Define NV bit image	○	○		○	(Line)	—
FS r	Read NV bit image						
FS !	Specify Kanji character print mode	○***	○***		○	○	○
FS &	Specify Kanji character mode	○***	○***		○	○	○
FS -	Turn underline mode on/off for Kanji character	○***	○***		○	○	○
FS .	Turn Kanji character mode off	○***	○***		○	○	○
FS 2	Define download Kanji character	○***	○***		○	○	○
FS C	Select Kanji character code system	○*	○*		○	○	○
FS S	Set the space amount of Kanji character	○***	○***		○	○	○
FS W	Turn quadruple-size mode on/off for Kanji character	○***	○***		○	○	○
FS k	Select Kanji character font				○	○	○
GS !	Select character size	○	○		○	○	○
GS \$	Set absolute vertical print position in page mode	○**	○		○	—	○
GS *	Define download bit image	○	○		○	○	○
GS (A	Execute test printing	○	○	○		○	—
GS /	Print download bit image	○	○	○		(PBE)	○
GS :	Start/end macro definition	○	○	○	○	○	○
GS B	Turn white/black reverse printing mode on/off	○	○		○	○	○
GS E	Select printing speed		○		○	○	○
GS H	Select printing position of HRI characters	○	○		○	○	○
GS I	Transmit printer ID	○	○	○		○	○
GS L	Set left margin	○**	○		○	(Line)	(Set)
GS P	Specify basic calculate pitch	○	○		○	○	○
GS V	Cut paper	○**	○	○		(Line)	○
GS W	Set printing area width	○**	○		○	(Line)	(Set)
GS \	Set relative vertical printing position in page mode	○**	○	○		—	○
GS ^	Execute macro	○	○	○		○	○
GS a	Enable/disable Automatic Status Back	○	○	○	○	○	○
GS b	Turn smoothing mode on/off					○	○
GS f	Select font for HRI characters	○	○		○	○	○
GS h	Select bar code height	○	○		○	○	○
GS k	Print bar code	○	○	○		(PBE)	○
GS r	Transmit status	○	○	○		○	○
GS v 0	Print raster bit image	○	○	○		(Line)	—
GS w	Select bar code width					○	○

* = Japanese model only

**=Influenced by GS P

*** = Japanese / Chinese / Korea characters only

(Line) Effective in case of top of line

(Set) Only set

(PBE) Effective in case of print buffer empty

6.2 DESCRIPTION OF THE COMMANDS

NAME	The name of the command.
[FORMAT]	The code sequence. ASCII indicates ASCII equivalents. HEX indicates the hexadecimal equivalents. < >H represents hexadecimal number, < > represents decimal number and []k represents a repeat count of k-times.
[RANGE]	Describes an argument value for the command.
[FUNCTION]	Describes the function of the command.
[CAUTION]	Describes a caution as required.
[DEFAULT]	Describes an initial value for the command as required.

6.3 DETAILES

HT Horizontal Tab

[FORMAT]	<09>H
[FUNCTION]	Moves the print start position to the next horizontal tab.
[CAUTION]	<ul style="list-style-type: none"> *The default setting is every 8 characters, (12 x 24). *This command is ignored unless the next horizontal tab position has been set. *Horizontal tab positions are set with ESC D.

FF Print in page mode and return to standard mode

[FORMAT]	<0C>H
[FUNCTION]	Prints the data in the printable area collectively and return to the standard mode.
[DETAILES]	<ul style="list-style-type: none"> *The data is deleted after being printed. *The printing area is reset to the default setting. *This command does not cut the paper. *After printing, the printing position is set to the beginning of the line. *This command is enabled only in page mode.

CR Carriage Return

[FORMAT]	<0D>H
[FUNCTION]	<ul style="list-style-type: none"> *This command prints the data in the print buffer and feeds one line. *This command begins a line feed if the data has not been printed or has been all space data.
[CAUTION]	*This function can be disabled by DIP switch setting.

This command is invalid.

LF Print and line feed

[FORMAT]	<0A>H
[FUNCTION]	<ul style="list-style-type: none"> *Prints the data in the print buffer and feeds one line. *This command begins a line feed if the data has not been printed or has been all space data.
[CAUTION]	<ul style="list-style-type: none"> *After finished printing, the next starting position for printing is the beginning of the line. *The default setting for the amount of linefeed is 4.125mm (33 dots).

DLE NUL Clear

[FORMAT] <10>H<00>H

[FUNCTION] ***DLE NUL** clears the data in the print buffer.
 *This command clears part of the printer configuration.

This command is invalid.**DLE ENQ Real-time request to printer**

[FORMAT] <10>H<05>H<n>

[RANGE] $1 \leq n \leq 2H$

[FUNCTION] **DLE ENQ** responds to a request in real time from the HOST, specified by n.
 n=1: After removing a cause of the error, the printing restarts from the beginning of the line where the error occurred.
 n=2: The printer can recover from an error after clearing the receive and print buffers.

[DETAILS] *This command is effective even when the printer is disabled with **ESC** = (selected peripheral device).
 *This command is effective only when an automatic cutter error occurs.
 *This command is executed when the data is received.
 *This command is executed even when the printer is off-line, the receive buffer is full, or an error occurs.

[CAUTION] *The user must notify that the printer performs the same operation with this command if printer receives the same character strings with this command.

EXAMPLE

d1=<10>H, d2=<05>H, d3=<01>H in **ESC * m n L nH [d] k**.

*This command must not be used within the data sequence of another command that consists of two or more bytes.

EXAMPLE

It must be noted that the code <10>H for **DLE ENQ 2** is processed as the code for **ESC 3** <10>H if **DLE ENQ 2** interrupts before n received, on the transmission of **ESC 3n** from the HOST to the printer.

DLE DC4 Real-time pulse output

[FORMAT] <10>H<14>H<n><m><t>

[RANGE] n=1
m=0 , 1
1 ≤ t ≤ 8H[FUNCTION] This command outputs the pulse specified by *t* to connector pin *m* as follows.

m	Connector pin
0	Plug 1
1	Plug 2

The pulse ON time is t x 100msec. and the OFF time is t x 100msec..

[DETAILS] *This command is ignored when the printer is in an error status while this command is processed.
 *When **ESC p** or **DEL DC4** is executed, this command is ignored and no pulse is sent.
 *This command is executed when the data is received.
 *This command is executed even when the printer is off-line, the receive buffer is full, or an error occurs.
 *This command is effective even when the printer is disabled with **ESC =** (selected peripheral device).

[CAUTION] *The user must notify that the printer performs the same operation with this command if printer receives the same character strings with this command
 *This command must not be used within the data sequence of another command that consists of two or more bytes.

DLE EOT Real-time status transmission[FORMAT] <10>H<04>H<n>
<1D>H<04>H<n>

[RANGE] 1 ≤ n ≤ 4H

[FUNCTION] Transmits the printer status specified by *n* in real-time.

n=1 Transmit printer status
 n=2 Transmit offline status
 n=3 Transmit error status
 n=4 Transmit paper roll sensor status

[CAUTION] *The printer transmits the status without confirming if the HOST is ready to receive data.
 *The user must notify that the printer performs the same operation with this command if printer receives the same character strings with this command
 *This command must not be used within the data sequence of another command that consists of two or more bytes.
 *When **Auto Status Back (ASB)**, **GS a** command, is effective, the status transmitted by the **DLE EOT** and the **ASB** status should be differentiated.

n = 1: Printer status

BIT	Function	VALUE	
		0	1
0	Not used	Fixed to off	-
1	Not used	-	Fixed to off

2	Drawer open/close signal(connector pin 3)	Low	High
3	Off/On	Online	Offline
4	Not used	-	Fixed to off
5	Undefined		
6	Undefined		
7	Not used	Fixed to off	-

n = 2: Offline status

BIT	Function	VALUE	
		0	1
0	Not used	Fixed to off	-
1	Not used	-	Fixed to off
2	Printer cover	Cover is closed	Cover is open
3	Paper FEED button	Not feeding	Under feeding
4	Not used	-	Fixed to off
5	Paper-end stop	No stop	stop
6	Error	No error	Error
7	Not used	Fixed to off	-

Bit 5: Printing stops when the paper end sensor detects paper end or the paper near end sensor (TH80s only) is turned on with **ESC C4**. (Refer to page 34 for more information.)

At this time, Bit 5 = 1.

n = 3: Error status

BIT	Function	VALUE	
		0	1
0	Not used	Fixed to off	-
1	Not used	-	Fixed to off
2	Motor slip	No error	Error
3	Autocutter	No error	Error
4	Not used	-	Fixed to off
5	Unrecoverble error	No error	Error
6	Auto recoverble error	No error	Error
7	Not used	Fixed to off	-

Bit 6: When printing is stopped due to high print head temperature until the print head temperature drops sufficiently, bit 6 b is on.

n = 4: Paper roll sensor status

BIT	Function	VALUE	
		0	1
0	Not used	Fixed to off	-
1	Not used	-	Fixed to off
2	Paper roll near-end sensor (Near-end sensor model only)	Adequate	Near-end
3		Adequate	Near-end
4	Not used	-	Fixed to off
5	Paper roll sensor	Present	End
6		Present	End
7	Not used	Fixed to off	-

CAN Cancel print data

[FORMAT] <18>H

[FUNCTION] Deletes all the print data in the current printable area in page mode.

[DETAILS] This command is enabled only in page mode.

ESC FF Print data in page mode

[FORMAT] <1B>H<0C>H

[FUNCTION] Prints all buffered data in the printing area collectively in page mode.

[DETAILS] *This command is enabled only in page mode.

*After printing, the printer keeps the buffered data, setting values for **ESC T** and **ESC W**, and the position for buffering character data.**ESC SP Set the right space amount of the character**

[FORMAT] <1B>H<20>H<n>

[RANGE] $0 \leq n \leq 255$ [FUNCTION] Sets the character spacing for the right space amount of the character to [n x horizontal or vertical motion units].

[CAUTION] *This command does not affect setting Kanji characters.

*The right space amount in double wide mode is twice the set volume.

*This command can set value independently in each mode of standard and page modes.

[DEFAULT] $n = 1$ **ESC ! Select print mode**

[FORMAT] <1B>H<21>H<n>

[RANGE] $0 \leq n \leq FFH$

[FUNCTION] *Selects print mode collectively.

*Selects print mode using n as follows.

BIT	Function	VALUE	
		0	1
0	Character font	Font A	Font B
1	Character font	(Depend on bit 0)	Font B
2	Undefined		
3	Emphasizing	Cancelled	Selected
4	Double-height	Cancelled	Selected
5	Double-width	Cancelled	Selected
6	Undefined		
7	Underline	Cancelled	Selected

[DEFAULT] $n=0$

[CAUTION] *Specification with double-height and width, and underline are invalid to Kanji.

*Character font can be changed at the beginning of a line only.

ESC \$ Set absolute print position

[FORMAT] <1B>H<24>H<n1><n2>

[RANGE] $0 \leq n1 \leq FFH$ $0 \leq n2 \leq FFH$

- [FUNCTION] Sets the distance from the beginning of the line to the position at which subsequent characters should be printed. The distance from the beginning of the line to the print position is $(n1 + n2 \times 256) \times$ (vertical or horizontal motion unit).
- [CAUTION] Setting outside the printable area are ignored.

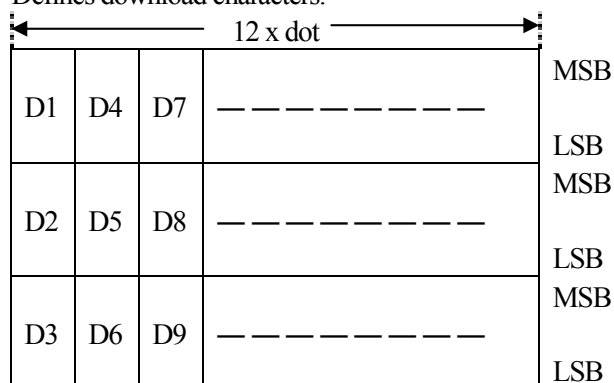
ESC % Specify/cancel download character set

- [FORMAT] $\langle 1B \rangle H \langle 25 \rangle H \langle n \rangle$
- [RANGE] $0 \leq n \leq 1$
- [FUNCTION] $n=0$ Internal character set is specified.
 $n=1$ Download character set is specified.
- [DEFAULT] $n=0$

ESC & Define download characters

- [FORMAT] $\langle 1B \rangle H \langle 26 \rangle H \langle s \rangle \langle c1 \rangle \langle c2 \rangle [x1 \ d1 \dots dn] \dots [xk \ d1 \dots dn]$
- [RANGE] $s=2, 3$ The number of bytes in the vertical direction.
 (2: font B, 3: font A)
 $20H \leq c1 \leq FEH$ The beginning character for the definition.
 $20H \leq c2 \leq FEH$ The final code for the definition.
 $x=12$ The number of dots in the horizontal direction when font A is selected.
 $x=8$ The number of dots in the horizontal direction when font B is selected.
 $0 \leq d \leq FFH$ The dot data for the character.

- [FUNCTION] Defines download characters.



*When font A is selected.

- [CAUTION] *Font A and font B cannot be defined simultaneously.

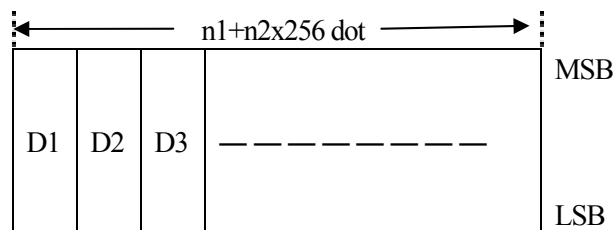
ESC * Specify the bit-image mode

- [FORMAT] $\langle 1B \rangle H \langle 2A \rangle H \langle m \rangle \langle n1 \rangle \langle n2 \rangle [d1 \dots dk]$
- [RANGE] $m=0, 1, 32, 33$ Mode
 $0 \leq n1 \leq FFH$ Low 8 bits of the number of printing dot.

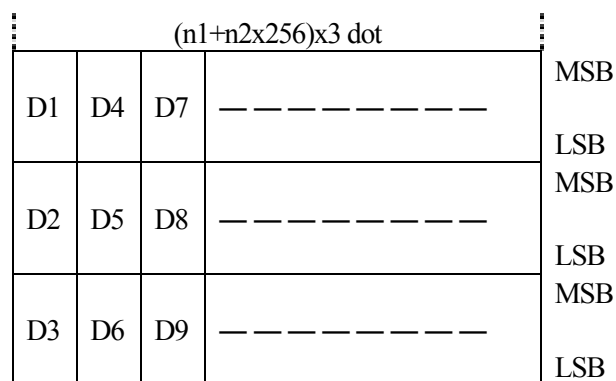
$0 \leq n2 \leq 1$ High 8 bits of the number of printing dot.
 $0 \leq d \leq FFH$ Bit image data

[FUNCTION] Prints data following the bit image modes specified by m

m	Mode	Vertical direction No. of dots	Vertical direction Dot density	Horizontal direction Dot density	No. of data
0	8-dot single-density	8	67DPI	100DPI	$n1 + n2 \times 256$
1	8-dot double-density	8	67DPI	200DPI	$n1 + n2 \times 256$
32	24-dot single-density	24	200DPI	100DPI	$(n1 + n2 \times 256) \times 3$
33	24-dot double-density	24	200DPI	200DPI	$(n1 + n2 \times 256) \times 3$



8-dot bit image (8-dot single-density is extended double to the horizontal direction.)



24-dot bit image (24-dot single-density is extended double to the horizontal direction.)

ESC - Turn underline mode on/off

[FORMAT] <1B>H<2D>H<n>

[RANGE] $0 \leq n \leq 2$, $48 \leq n \leq 50$

[FUNCTION] Turns underline mode on or off.

n	Function
0,48	Turns off underline mode
1,49	Turns on underline mode of 1-dot thick
2,50	Turns on underline mode of 2-dot thick

[CAUTION]

*An underline is attached to the full character width including right side character spacing, but not attached to the space set by HT and 90° clockwise rotated character by **ESC V**.

*When underline mode is turned off by setting the value of *n* to 0 or 48, the following data is not underlined and the underline thickness set before the mode is turned off is kept. The default underline thickness is 1 dot.

*Changing the character size does not affect the current underline thickness.

*This command does not affect Kanji printing.

Ref. **FS -, Turn underline mode on/off for Kanji character.**

*Underline mode can also be turned on or off by using **ESC !**, but note that the last received command is effective. When underline mode is turned off by using **ESC -** after turned on by **ESC !**, underline mode by **ESC !** is turned off.

[DEFAULT]

n=0

ESC 2 Specify 1/6-inch line spacing

[FORMAT]

<1B>H<32>H

[FUNCTION]

The line spacing per line is specified by 1/6 inch.

[DEFAULT]

*The default setting is 4.125mm (33 dots).

ESC 3 Set line spacing

[FORMAT]

<1B>H<33>H<*n*>

[RANGE]

0 ≤ *n* ≤ 255

[FUNCTION]

*Sets the line spacing to [*n* x vertical or horizontal motion unit].

*The line spacing can be set independently in standard mode and in page mode.

[DEFAULT]

Line spacing equivalent to 1/6 inch.

ESC 4 Set logo pattern data

[FORMAT]

<1B>H<34>H<*n*1><*n*2> data1 – data720

[RANGE]

1 ≤ *n*1 ≤ 127

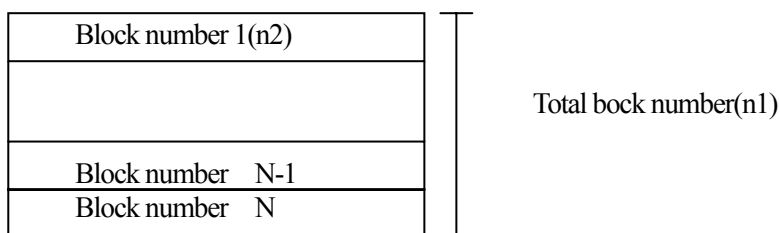
1 ≤ *n*2 ≤ 127

This command is invalid.

[FUNCTION]

Sets logo pattern data by this command.

[CAUTION] * $n1$ is the total block number of logo pattern which should be set.



- $n2$ is the block number which should be set.
- data1 – data720 sets logo pattern data.

MSB	LSB				
1	8	9	16	17	713 720
d1	d2			d71	d72
d72	d74			d143	d144
d713	d714			d719	d720

1dot line

2dot line

10dot line

ESC = Set peripheral device

[FORMAT] <1B>H<3D>H< n >

[RANGE] $0 \leq n \leq 255$

[FUNCTION] $n = \text{<*****0>B}$: printer disabled, ignores all data.
 $n = \text{<*****1>B}$: Printer enabled.

ESC ? Cancel download characters

[FORMAT] <1B>H<3F>H< n >

[RANGE] $32 \leq n \leq 126$

[FUNCTION] Cancels download characters.

[CAUTION] * n is the character code which cancels the defined pattern. After the download characters are canceled, the pattern for the internal character is printed.
 *This command deletes the pattern defined for the specified code in the font selected by **ESC !**.
 *If a download character has not been defined for the specified character code, the printer ignores this command.
 *If n is out of the range, the printer ignores this command.

ESC @ Initialize printer

[FORMAT] <1B>H<40>H

[RANGE] $32 \leq d \leq 126$

[FUNCTION] Clears the data in the print buffer and initializes the printer mode which set by the software.

- [CAUTION] *The DIP switch settings are not checked again.
 *The data in the receive buffer is not cleared.
 *The macro definition is not cleared.
 *The NV bit image data is not cleared.

ESC D Set horizontal tab positions

- [FORMAT] <1B>H<44>H[d1...dk]<00>
- [RANGE] $0 \leq d \leq FFH$ $1 \leq k \leq 32$
- [FUNCTION] Sets horizontal tab positions.
- [CAUTION] **d* specifies the column number.
 **k* indicates the total number of horizontal tab position
 *The horizontal tab position is set at position where it is [character width x the column number]
 from the beginning of the line.
 *The horizontal tab position does not change even if the character width is altered after setting the
 horizontal tab position.
 *Set *d* in ascending order.
 ***ESC D 00h** cancels all horizontal tab positions.
 *Data exceeding 32 tab positions is ignored.
- [DEFAULT] Intervals of 8 characters.

ESC E Turn emphasized mode on/off

- [FORMAT] <1B>H<45>H<n>
- [RANGE] $0 \leq n \leq 255$
- [FUNCTION] Turns emphasized mode on or off.
 $n = \text{<*****0>B}$ Emphasized mode is turned off.
 $n = \text{<*****1>B}$ Emphasized mode is turned on.
- [DETAILS] **n* is valid only for the lowest bit.
 *Emphasized mode can be turned on and off by **ESC !** as well but the last received command is
 effective.
- [DEFAULT] $n=0$ (emphasized mode off)

ESC G Turn double-strike mode on/off

- [FORMAT] <1B>H<47>H<n>
- [RANGE] $0 \leq n \leq 255$
- [FUNCTION] Turns double-strike mode on or off.

n=<*****0>B Double-strike mode is turned off.
 n=<*****1>B Double-strike mode is turned on.

[DETAILES] *n is valid only for the lowest bit.
 *Printer output is all the same with emphasized mode.

[DEFAULT] n=0 (double-strike mode off)

ESC J Print and feed paper

[FORMAT] <1B>H<4A>H<n>

[RANGE] 0≤n≤255

[FUNCTION] Prints the data in the print buffer and feeds the paper [n x vertical or horizontal motion unit].

ESC L Select page mode

[FORMAT] <1B>H<4C>H

[FUNCTION] Switches from standard mode to page mode.

[DETAILES] *This command is enabled only when processed at the beginning of a line in standard mode.
 *This command is ignored in page mode.
 *The printer returns to standard mode after printing by **FF** is completed or by using **ESC S**.
 *This command sets the position where data is buffered to the position specified by **ESC T** within the printing area defined by **ESC W**.
 *This command switches the setting for the following commands which have each value independently in standard mode and page mode to those for page mode.

- ☐ Set right-side character spacing: **ESC SP**, **FS S**
- ☐ Set default line spacing: **ESC 2**, **ESC 3**

*Only setting is possible for the following commands in page mode.

- ① **ESC V** Turn 90° clockwise rotation mode on/off.
- ② **ESC a** Select justification.
- ③ **ESC {** Turn upside-down printing mode on/off.
- ④ **GS L** Set left margin.
- ⑤ **GS W** Set printing area width

*The following command is not available in page mode.

- ① **FS p** Print NV bit image.
- ② **FS q** Define NV bit image.
- ③ **FS gl** Write to NV user memory.
- ④ **GS v 0** Print raster bit image.

*The printer returns to standard mode when **ESC @** is used.

ESC M Select character font

[FORMAT] <1B>H<4D>H<n>

[RANGE] n=0,1,48,49

[FUNCTION] Selects character fonts.

n	Function
0,48	Font A (12 x 24) selected.

1,49 Font B (8x16) selected.

[DETAILS] The **ESC !** command can also select the character fonts but the setting of the last received command is effective.

ESC R Select an international character set

[FORMAT] <1B>H<52>H<n>

[RANGE] $0 \leq n \leq 13$

[FUNCTION] *Selects an international character set.
*The code table is as follows.

	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
n=0 (U.S.A)	#	\$	@	[\]	^	•	{		}	~
n=1 (FRANCE)	#	\$	à	•	ç	§	^	•	é	ù	è	..
n=2 (GERMANY)	#	\$	§	Ä	Ö	Ü	^	•	ä	ö	ü	ß
n=3 (U.K)	£	\$	@	[\]	^	•	{		}	~
n=4 (DENMARK)	#	\$	@	Æ	Ø	Å	^	•	æ	ø	å	~
n=5 (SWEDEN)	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
n=6 (ITALY)	#	\$	@	•	\	é	^	ù	à	ò	è	ì
n=7 (SPAIN)	¢	\$	@	í	ñ	¿	^	•	..	ñ	}	~
n=8 (JAPAN)	#	\$	@	[¥]	^	•	{		}	~
n=9 (NORWAY)	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
n=10 (DENMARK2)	#	\$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
n=11 (SPAIN2)	#	\$	á	í	ñ	¿	é	•	í	ñ	ó	ú
n=12 (LATIN)	#	\$	á	í	ñ	¿	é	ü	í	ñ	ó	ú
n=13 (KOREA)	#	\$	@	[₩]	^	•	{		}	~

ESC S **Select standard mode**

[FORMAT] <1B>H<53>H

[FUNCTION] Switches from page mode to standard mode.

[DETAILS] *This command is effective only in page mode.
*Data buffered in page mode are cleared.
*This command sets the print position to the beginning of the next line after executed.
*The printing area set by **ESC W** are initialized.
*This command switches the setting for the following commands which have each value independently in standard mode and page mode to those for standard mode.

- ① Set right-side character spacing: **ESC SP**、**FS S**
- ② Select default line spacing: **ESC 2**、**ESC 3**

*Only setting is possible for the following commands in standard mode.

- ① **ESC W** Set printing area in page mode.
- ② **EST T** Select printing direction in page mode.

*The following commands are ignored in standard mode.

- ① **GS \$** Set absolute vertical print position in page mode.
- ② **GS ** Set relative vertical print position in page mode.

*Standard mode is selected automatically when power is turned on or **ESC @** is used.

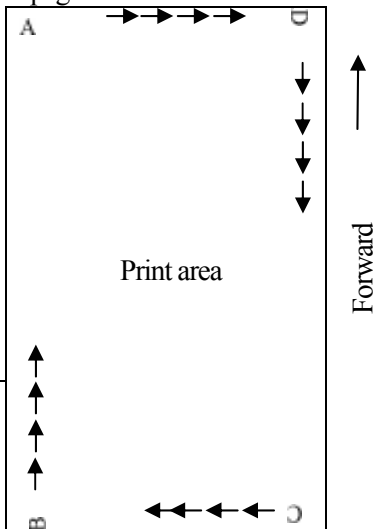
ESC T Select print direction in page mode

[FORMAT] <1B>H<54>H<n>

[RANGE] $0 \leq n \leq 3$, $48 \leq n \leq 51$

[FUNCTION] Selects the print direction and start position in page mode.

n	Print direction	Starting position
0,48	Left to right	Upper left (A in the right figure)
1,49	Bottom to top	Lower left (B in the right figure)
2,50	Right to left	Lower right (C in the right figure)
3,51	Top to bottom	Upper right (D in the right figure)



[DETAILS] *When the command is selected in standard mode, the printer executes only internal flag operation. This command does not affect printing in standard mode.

*This command sets the position where data is buffered within the printing area set by **ESC W**.

* Horizontal or vertical motion units (x or y) of the following commands differ depending on the starting position of the printing area.

①If the starting position is the upper left or lower right, data is buffered in the direction perpendicular to the paper feed direction.

Commands using horizontal motion units (x) : **ESC SP**, **ESC \$**, **ESC **.Commands using vertical motion units (y) : **ESC 3**, **ESC J**, **GS \$**, **GS **.

②If the starting position is the upper right or lower left, data is buffered in the paper feed direction.

Commands using horizontal motion units (x) : **ESC 3**, **ESC J**, **GS \$**, **GS **.Commands using vertical motion units (y) : **ESC SP**, **ESC \$**, **ESC **.

[DEFAULT] n=0

ESC V Turn 90° clockwise rotation mode on/off

[FORMAT] <1B>H<56>H<n>

[RANGE] $0 \leq n \leq 1H$, $30H \leq n \leq 31H$

[FUNCTION] Turns 90° clockwise rotation mode on/off.

*n=0,30H Turns off

*n=1,31H Turns on

[CAUTION] Double-width and double-height commands in 90° rotation mode enlarge characters in the opposite directions from double-height and double-width commands in normal mode.

[DEFAULT] n=0

ESC W Set printing area in page mode

[FORMAT] <1B>H<57>H<xL>xH<yL>yH<dxL>dxH<dyL>dyH>

[RANGE] $0 \leq xL, xH, yL, yH, dxL, dxH, dyL, dyH \leq 255$

ATTN: Except $dxL=dxH=0$ or $dyL=dyH=0$

[FUNCTION] Sets printing area and position.

Horizontal starting position $=(xL + xH \times 256) \times \text{horizontal motion unit}$

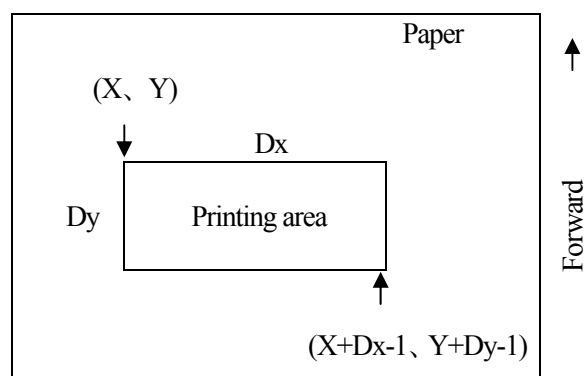
Vertical starting position $=(yL + yH \times 256) \times \text{vertical motion unit}$

Printing area width $=(dxL + dxH \times 256) \times \text{horizontal motion unit}$

Printing area height $=(dyL + dyH \times 256) \times \text{vertical motion unit}$

[DETAILS]

- *When the command is selected in standard mode, the printer executes only internal flag operation. This command does not affect printing in standard mode.
- *If the horizontal or vertical starting position is out of the printable area, the printer stops command processing and processes the following data as normal data.
- *If the printing area width or height is 0, the printer stops command processing and processes the following data as normal data.
- *The position where data is buffered is the position specified by **ESC T** within the printing area.
- *If (horizontal starting position + printing area width) exceeds the printable area, the printing area width is set to (horizontal printable area – horizontal starting position.)
- *If (vertical starting position + printing area height) exceeds the printable area, the printing area height is set to (vertical printable area – vertical starting position).
- *The horizontal and vertical motion unit are set by **GS P**. Changing the horizontal or vertical motion unit after set printing area, does not affect the current printing area.
- *The calculated result is truncated to the minimum value of the mechanical pitch.
- *Use the horizontal motion unit (x) for setting the horizontal starting position and printing area width and also use the vertical motion unit (y) for setting the vertical starting position and printing area height.
- *The printing area is as follows if the horizontal starting position is defined as X, vertical starting position as Y, printing area width as Dx and printing area height as Dy.



*The printable area for this printer is approximately 72.2mm {576 dot (519/180")} in the horizontal direction and approximately 104mm {831 dot (1496/360")} in the vertical direction.

[DEFAULT] $xL=xH=yL=yH=0$
 $dxL+dxH \times 256=519 \quad dyL+dyH \times 256=1496$

ESC \ Select relative print position

[FORMAT] <1B>H<5C>H<n1><n2>

[RANGE] $0 \leq n1 \leq FFH$
 $0 \leq n2 \leq FFH$ [FUNCTION] *Sets the print starting position based on the current position.
*[(n1+n2×256)× horizontal or vertical motion unit].[CAUTION] *Setting that exceeds the printable area is ignored.
*When the printable area moves from current position to the right, specify positive direction and to the left, specify negative direction.
(When pitch N moves to the left) $65536-N = n1+n2 \times 256$ **ESC a Select justification**

[FORMAT] <1B>H<61>H<n>

[RANGE] $0 \leq n \leq 2, 48 \leq n \leq 50$ [FUNCTION] Aligns all the printed data within one line to the specified position.
n = 0,48 Left justification
n = 1,49 Centering
n = 2,50 Right justification

[CAUTION] *This command is enabled only when processed at the beginning of a line.

[DEFAULT] n=0

ESC c 3 Select paper sensor to output paper end signals

[FORMAT] <1B>H<63>H<33>H<n>

[RANGE] $0 \leq n \leq 255$ This command is invalid.

[FUNCTION] Selects the paper sensor to output paper end signals.

BIT	FUNCTION	HEX.
0	Paper roll near end sensor disabled	00
	Paper roll near end sensor enabled.	01
1	Paper roll near end sensor disabled	00
	Paper roll near end sensor enabled.	02
2	Paper roll end sensor disabled	00
	Paper roll end sensor enabled.	04
3	Paper roll end sensor disabled	00
	Paper roll end sensor enabled.	08
4	Undefined	-
5	Undefined	-
6	Undefined	-
7	Undefined	-

*Bit 0 and 1 are valid only on near-end sensor model.

[CAUTION]

*This command is effective only with a parallel interface and is ignored with a serial interface.

*It is possible to select multiple sensors to output signals. If multiple sensors are effective, the paper end signal is output when any of the sensors detects a paper end.

*The paper end signal switching may be delayed depending on the receive buffer state because sensor is switched when this command is executed.

*If either bit 0 or bit 1 is on, the paper roll near-end sensor is selected as the paper sensor which outputs paper end signals. This function is valid only on model TH-80s.

*If either bit 2 or bit 3 is on, the paper roll end sensor is selected as the paper sensor which outputs paper end signals.

*When all the sensors are disabled, the paper end signal always outputs a paper present status.

[DEFAULT]

n=1

ESC c 4 Select paper sensor to stop printing (Near-end sensor model only)

[FORMAT] <1B>H<63>H<34>H<n>

[RANGE] $0 \leq n \leq 255$

[FUNCTION] Selects the paper sensor to stop printing when a paper near end is detected.

BIT	FUNCTION	VALUE	
		0	1
0	Paper roll near end sensor.	Disabled.	Enabled.
1	Undefined.	-	-
2	Undefined.	-	-
3	Undefined.	-	-
4	Undefined.	-	-
5	Undefined.	-	-
6	Undefined.	-	-
7	Undefined.	-	-

*This function is valid only on near-end sensor model .

[DEFAULT] n=0

ESC c 5 Enable/disable panel switches

[FORMAT] <1B>H<63>H<35>H<n>

[RANGE] $0 \leq n \leq 255$ n is valid only in the lowest bit.

[FUNCTION] n=<*****0>B The panel switches are enabled.
n=<*****1>B The panel switches are disabled

[DEFAULT] n=0

ESC d Print and feed n lines

[FORMAT] <1B>H<64>H<n>

[RANGE] $1 \leq n \leq 255$

[FUNCTION] Prints the data in the print buffer and feeds n lines.

ESC i Full cut (one point left uncut)

[FORMAT] <1B>H<69>H

[RANGE] -

[FUNCTION] Sets full cut. (one point left uncut)

[CAUTION] *Paper must be fed 3 mm after printing to prevent paper jam.

ESC k Select characters (ANK)

[FORMAT] <1B>H<6B>H<n>

[RANGE] $0 \leq n \leq 1$ This command is invalid.[FUNCTION] Select ANK characters specified by *n*.

BIT	FUNCTION	VALUE	
		0	1
0	Select characters	Mintyo	Gothic
1	Undefined	-	-
2	Undefined	-	-
3	Undefined	-	-
4	Undefined	-	-
5	Undefined	-	-
6	Undefined	-	-
7	Undefined	-	-

[CAUTION] This command ignores in the model with one of above characters

ESC m Partial cut (one point left cut)

[FORMAT] <1B>H<69>H

[RANGE] -

[FUNCTION] Sets Partial cut.

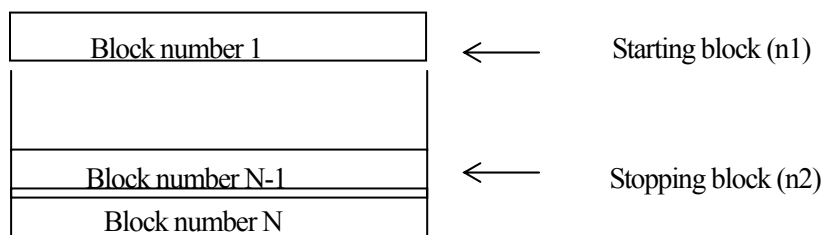
[CAUTION] * Paper must be fed 3 mm after printing to prevent paper jam.

ESC o Print logo pattern

[FORMAT] <1B>H<6F>H<n1><n2>

[RANGE] $1 \leq n1 \leq 127$
 $1 \leq n2 \leq 127$

[FUNCTION] This command prints logo pattern.

[CAUTION] *n1 specifies starting block of the logo pattern.
*n2 specifies stopping block of the logo pattern.

*This command is enabled only when processed at the beginning of a line.

ESC p Generate pulse

[FORMAT] <1B>H<70>H<m><n1><n2>

[RANGE] m=0,1,48,49
0≤n1≤FFH
0≤n2≤FFH
n1≤n2[FUNCTION] m=0,48: Outputs the pulse specified by n1 and n2 to drawer no. 1.
m=1,49: Outputs the pulse specified by n1 and n2 to drawer no. 2.[CAUTION] *The pulse ON time is n1 x 2 msec. and OFF time is n2 x 2 msec.
*If n2<n1, the pulse OFF time is n1 x 2msec.
*Do not activate the drawer continuously.**ESC t Select character code table**

[FORMAT] <1B>H<74>H<n>

[RANGE] 0≤n≤5、n=18,19

[FUNCTION] Selects a page *n* of the character code table.

n	PAGE
0	PC437(USA:Standard Europe)
1	Kana
2	PC850(Multilingual)
3	PC860(Portuguese)
4	PC863(Canadian-French)
5	PC865(Nordic)
18	PC852(Latin 2)
19	PC858

[DEFAULT] n=0

Character code table

CodePage 437

	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0
0	0	1	2	3	4	5	6	7	8	9	A	B	C	D
1	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
2	S	T	U	V	W	X	Y	Z	[\]	^	_	`
3	a	b	c	d	e	f	g	h	i	j	k	l	m	n
4	o	p	q	r	s	t	u	v	w	x	y	z	{	}
5	~													
6														
7														
8														
9														
A														
B														
C														
D														
E														
F														

Kana

	80	90	A0	B0	C0	D0	E0	F0
0								
1								
2								
3								
4								
5								
6								
7								
8								
9								
A								
B								
C								
D								
E								
F								

850(Multilingual)

	80	90	A0	B0	C0	D0	E0	F0
0	Ç	É	á	⋮	└	ō	ó	—
1	Û	æ	í	⋮	└	ð	ß	±
2	é	Æ	ó	⋮	└	ē	ô	=
3	â	ô	û		└	ē	ô	¾
4	ä	ö	ñ	└	—	ē	ô	π
5	à	ò	ñ	À	+	ı	ō	§
6	â	û	ä	Ä	ä	ı	μ	÷
7	Ç	Û	Ω	À	Ä	ı	ı	ı
8	é	ÿ	ö	ö	└	ı	ı	°
9	ë	ö	ö	ı	ı	ı	ı	ı
A	è	ü	ı	ı	ı	ı	ı	ı
B	ı	ı	ı	ı	ı	ı	ı	ı
C	ı	ı	ı	ı	ı	ı	ı	ı
D	ı	ı	ı	ı	ı	ı	ı	ı
E	Ä	X	«	ı	ı	ı	ı	ı
F	Ä	f	»	ı	ı	ı	ı	ı

860(Portuguese)

	80	90	A0	B0	C0	D0	E0	F0
0	Ç	É	á	⋮	└	ı	α	≡
1	Û	Ä	ı	⋮	└	ı	ß	±
2	é	É	ó	⋮	└	ı	Γ	≥
3	â	ô	û		└	ı	κ	≤
4	ä	ö	ñ	└	—	ı	Σ	ı
5	à	ò	ñ	ı	+	ı	σ	ı
6	Ä	Û	ä	ı	ı	ı	μ	÷
7	Ç	Û	Ω	ı	ı	ı	ı	ı
8	é	ı	ö	ı	ı	ı	ı	ı
9	É	ö	ö	ı	ı	ı	ı	ı
A	è	ü	ı	ı	ı	ı	ı	ı
B	ı	ı	ı	ı	ı	ı	ı	ı
C	ı	ı	ı	ı	ı	ı	ı	ı
D	ı	ı	ı	ı	ı	ı	ı	ı
E	Ä	ı	«	ı	ı	ı	ı	ı
F	Ä	ö	»	ı	ı	ı	ı	ı

863(CanadianFrench)

	80	90	A0	B0	C0	D0	E0	F0
0	Ç	É	ı	⋮	└	ı	α	≡
1	Û	É	ı	⋮	└	ı	ß	±
2	é	É	ó	⋮	└	ı	Γ	≥
3	â	ô	û		└	ı	κ	≤
4	Ä	É	ı	└	—	ı	Σ	ı
5	à	ı	ı	ı	+	ı	σ	ı
6	ı	ı	ı	ı	ı	ı	μ	÷
7	Ç	Û	ı	ı	ı	ı	ı	ı
8	é	ı	ı	ı	ı	ı	ı	ı
9	ë	ö	ı	ı	ı	ı	ı	ı
A	è	ü	ı	ı	ı	ı	ı	ı
B	ı	ı	ı	ı	ı	ı	ı	ı
C	ı	ı	ı	ı	ı	ı	ı	ı
D	ı	ı	ı	ı	ı	ı	ı	ı
E	Ä	ı	«	ı	ı	ı	ı	ı
F	Ä	f	»	ı	ı	ı	ı	ı

865(Nordic)

	80	90	A0	B0	C0	D0	E0	F0
0	Ç	É	á	⋮	└	ı	α	≡
1	Û	æ	ı	⋮	└	ı	ß	±
2	é	Æ	ó	⋮	└	ı	Γ	≥
3	â	ô	û		└	ı	κ	≤
4	ä	ö	ñ	└	—	ı	Σ	ı
5	à	ò	ñ	ı	+	ı	σ	ı
6	Ä	Û	ä	ı	ı	ı	μ	÷
7	Ç	Û	Ω	ı	ı	ı	ı	ı
8	é	ÿ	ö	ı	ı	ı	ı	ı
9	ë	ö	ı	ı	ı	ı	ı	ı
A	è	ü	ı	ı	ı	ı	ı	ı
B	ı	ı	ı	ı	ı	ı	ı	ı
C	ı	ı	ı	ı	ı	ı	ı	ı
D	ı	ı	ı	ı	ı	ı	ı	ı
E	Ä	ı	«	ı	ı	ı	ı	ı
F	Ä	f	ı	ı	ı	ı	ı	ı

PC852(Latin2)

	80	90	A0	B0	C0	D0	E0	F0
0	Q	E	A	...	L	d	O	—
1	U	L	i	...	+	B	B	~
2	e	i	O	...	+	D	O	.
3	A	O	U		+	E	N	~
4	a	O	A	+	—	d	n	~
5	U	L	a	A	+	N	n	S
6	C	I	Z	A	A	I	S	÷
7	Q	S	Z	E	A	I	S	~
8	7	S	E	S	L	e	R	°
9	e	O	e	+	+	+	U	..
A	O	U	.		+	+	+	~
B	O	T	Z	+	+	+	U	U
C	i	t	C	+	+	+	Y	R
D	Z	L	S	Z	=	T	Y	R
E	A	X	«	Z	+	+	t	■
F	C	C	»	+	+	+	+	~

858

	80	90	A0	B0	C0	D0	E0	F0
0	Q	E	A	...	L	O	O	—
1	U	a	i	...	+	B	B	±
2	e	Æ	O	...	+	E	O	=
3	A	O	U		+	E	O	¾
4	a	O	n	+	—	E	O	¶
5	a	O	N	A	+	E	O	S
6	a	U	a	A	A	I	μ	÷
7	Q	U	Q	A	A	I	+	~
8	e	Y	U	Q	L	Y	+	°
9	e	O	e	+	+	+	U	..
A	e	U	+		+	+	U	—
B	T	ø	½	+	+	+	U	'
C	i	æ	¼	+	+	+	Y	°
D	i	ø	i	Q	=	+	Y	°
E	A	X	«	¥	+	+	+	■
F	A	f	»	+	+	+	+	~

ESC u Transmit drawer status

[FORMAT] <1B>H<75>H<n>

This command is invalid.

[RANGE] n=0、48

[FUNCTION] Transmits the status of drawer sensor.

Status bit 0 = 0: plug 1 Closed

Bit 0 = 1: plug 1 Open

Bit 1 = 0: plug 2 Closed

Bit 1 = 1: plug 2 Open

ESC { Turn upside-down printing mode on/off

[FORMAT] <1B>H<7B>H<n>

[RANGE] $0 \leq n \leq FFH$

[FUNCTION] Turns upside-down printing mode on or off.

*n = Turn off even number

*n = Turn on odd number.

[CAUTION] *This command is enabled only when processed at the beginning of a line.

[DEFAULT] n=0

ESC ~ Select print density

[FORMAT]	<1B>H<7E>H<m><n>
[RANGE]	m=0, 0≤n≤7
[FUNCTION]	Selects print density. Sets print density specified by n as follows. n=0 Lightest n=7 Deepest
[CAUTION]	This command is enabled only when processed at the beginning of a line.
[DEFAULT]	n=3

FS g 1 Write to NV user memory

[FORMAT]	<1C>H<67>H<31>H<m><a1><a2><a3><a4><nL><nH>[d1...dk]
[RANGE]	m=0 0≤(a1+(a2x256)+(a3x65536)+(a4x16777216))≤1023 1≤(nL+(nHx256))≤1024 32≤d≤255 k=(nL+(nHx256))
[FUNCTION]	Writes data to NV(Non-volatile) user memory. *m is set to 0. *a1、a2、a3 and a4 specify the stored starting address of the data to (a1+(a2x256)+(a3x65536)+(a4x16777216). *nL、nH set the number of stored data to (nL+(nHx256)) bytes. *d specifies the stored data.
[DETAILS]	*NV user memory is the memory area which is used for the stored character font data in non-volatile memory. *This command is enabled only when processed at the beginning of a line in standard mode. *This command is ignored in page mode. *When this command is received during macro definition, the printer stops macro definition and begins to process this command. *If the values of the argument (m), the stored starting address (a1,a2,a3,a4) and the number of the stored data (nL, nH) are out of the range, or if [the stored starting address (a1,a2,a3,a4) + the number of the stored data (nL, nH) ≥1024], this command is ignored and the following data is processed as normal data. *If the value of the stored data (d) is out of range, the procession of this command is ended and the data following are processed as normal data. In this case, the data which are already finished processing are stored in the NV user memory. *Procession which writes data to the NV user memory overwrites previous data. Thus, previous data is deleted. *If an error occurs during writing data to the NV user memory, "Memory or Gate array R/W error" appears. *Data of the stored in the NV user memory can be read by FS g 2 . *The data of the NV user memory is not initialized by executing ESC @ , FS q , reset or power off.
[CAUTION]	*Executing write command frequently by FS g 1 may damage to the NV memory. Thus, it is strongly recommended to write the NV memory 10 times or less a day. *When processing this command, the printer may be BUSY during writing the data to the NV user memory and stops receiving data. Thus, it is prohibited to transmit data from the HOST, including the real-time commands during the printer is busy.

FS g 2 Read to NV user memory

[FORMAT]	<1C>H<67>H<32>H<m><a1><a2><a3><a4><nL><nH>
[RANGE]	<p>$m=0$</p> <p>$0 \leq (a1 + (a2 \times 256) + (a3 \times 65536) + (a4 \times 16777216)) \leq 1023$</p> <p>$1 \leq (nL + (nH \times 256)) \leq 80$</p>
[FUNCTION]	<p>*Transmits data of NV (Non-volatile) user memory.</p> <p>*m is set to 0.</p> <p>*$a1$、$a2$、$a3$ and $a4$ specify the stored starting address of the data to $(a1 + (a2 \times 256) + (a3 \times 65536) + (a4 \times 16777216))$.</p> <p>*$nL$、$nH$ set the number of stored data to $(nL + (nH \times 256))$ bytes.</p>
[DETAILS]	<p>*NV user memory is the memory area which is used for the stored character font data in non-volatile memory.</p> <p>*If the values of the argument (m), the stored starting address ($a1, a2, a3, a4$) and the number of the stored data (nL, nH) are out of the range, or if [the stored starting address ($a1, a2, a3, a4$) + the number of the stored data (nL, nH) ≥ 1024], this command is ignored and the following data are processed as normal data.</p> <p>*When the data is ready to be transmitted, the printer executes the following process.</p> <ol style="list-style-type: none"> ① Executes (READY->BUSY). If it is already BUSY, the printer executes nothing. ② Executes to transmit [Header + Data +NUL] ③ Executes (BUSY->READY). If it is already BUSY for other cause, the printer executes nothing. <p>*The contents of [Header + Data +NUL] are as follows.</p> <p>Header: Hexadecimal = 5FH</p> <p>Data: Data of NV user memory $((nL + (nH \times 256))$ bytes)</p> <p>NUL: Hexadecimal = 00H</p> <p>*When DTR/DSR control is selected, the printer transmits all data continuously after confirming if the HOST is ready to receive data and sending the first header data. If the HOST is not ready to receive data, the printer waits until the HOST is ready.</p> <p>*When XON/XOFF control is selected, the printer transmits all data continuously without confirming whether the HOST is ready to receive data. The transmitted data must be continuous except for the XOFF code.</p> <p>*Data of the stored in the NV user memory can be written by FS g 1.</p> <p>*Any delay may be occurred between received transmission of this command and procession of the stored data depending on the received buffer status.</p>
[CAUTION]	<p>*After starting to transmit header, the printer transmits all data without confirming whether the HOST is ready to receive data. Thus, (the capacity of the transmitted data + 2) is required in the received buffer.</p> <p>*During data transmission, the printer ignores real-time command. Also, the printer does not transmit ASB status during data transmission even when the ASB is enabled. Thus, the user needs to note that the user cannot confirm changes of the printer status during data transmission.</p>

FS p Print NV bit image

[FORMAT] <1C>H<70>H<n><m>

[RANGE] $0 \leq n \leq 255$
 $0 \leq m \leq 3, 48 \leq m \leq 51$ [FUNCTION] Prints a NV (Non-volatile) bit image n using the mode specified by m .

m	Mode	Vertical Dot Density	Horizontal Dot Density
0,48	Normal	200 dpi	200 dpi
1,49	Double width	200 dpi	100 dpi
2,50	Double height	100 dpi	200 dpi
3,51	Quadruple	100 dpi	100 dpi

[dpi : Dots per 25.4mm (dots per inch)]

* n specifies the number of the NV bit image.* m specifies the bit image mode.[DETAILS] *NV bit image is a bit image which is defined in a non-volatile memory by **FS q** and can be printed by **FS p**.*This command is invalid when the specified NV bit image n is not defined.

*This command is effective only when there is not data in the print buffer, in standard mode.

*This command is invalid in page mode.

*This command is not affect by print modes (emphasized, double-strike, underline, character size, white/black reverse printing, rotated character) except upside-down printing.

*If the printing area set by **GS L** and **GS W** is less than one vertical line in NV bit image, the following procession is executed only on the line. Note that one vertical line in NV bit image is 1 dot in normal mode ($m=0,48$) and in double-height ($m=2,50$), and 2 dots in double-width mode ($m=1,49$) and quadruple mode ($m=3,51$).

① Within the printable area, the printing area width is extended to the right in NV bit image mode up to one line vertically.

② If the printing area width cannot be extended by one line vertically, the printing area width is extended to the left. (the left margin is reduced.)

*If the bit image exceeding printing area is specified, the exceeded data is not printed.

*This command feeds dots (height n of the NV bit image) in normal and double-width modes, and (height $n \times 2$ of the NV bit image) in double-height and quadruple modes, regardless with the line spacing set by **ESC 2** or **ESC 3**.

*After printing the bit image, this command sets the print position to the beginning of the line and processes the data following as normal data.

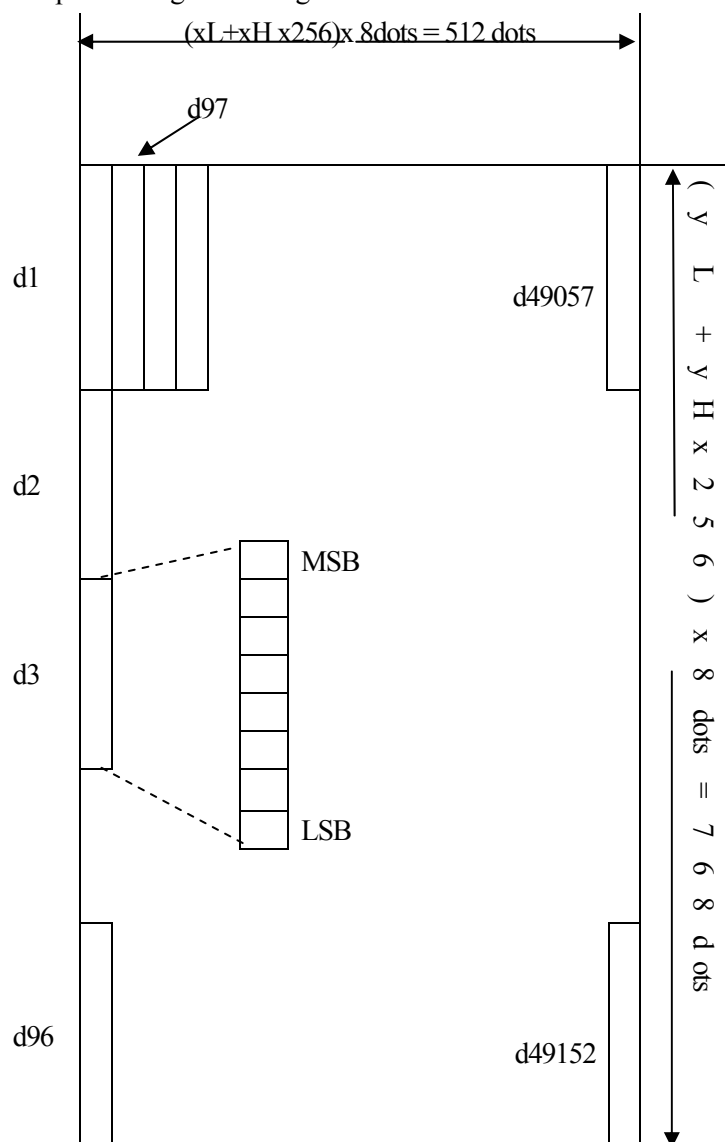
FS q	Define NV bit image
[FORMAT]	<1C>H<71>H<n>[xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n
[RANGE]	$1 \leq n \leq 255$ $0 \leq xL \leq 255$ $0 \leq xH \leq 3$ (When $1 \leq (xL + xH \times 256) \leq 1023$) $0 \leq yL \leq 255$ $0 \leq yH \leq 1$ (When $1 \leq (yL + yH \times 256) \leq 288$) $0 \leq d \leq 255$ $k = (xL + xH \times 256) \times (yL + yH \times 256) \times 8$ Total defined data area = 2M bits (256K bytes)
[FUNCTION]	<p>Defines the NV (Non-volatile) bit image specified.</p> <p>*n specifies the number of the defined NV bit image.</p> <p>*xL, xH specifies the horizontal direction for the NV bit image to $(xL + xH \times 256) \times 8$ dots.</p> <p>*yL, yH specifies the vertical direction for the NV bit image to $(yL + yH \times 256) \times 8$ dots.</p>
[DETAILS]	<p>*This command cancels all NV bit image which have been already defined. Thus, the printer cannot re-define only one of several defined data which have been previously defined. In this case, all data needs to be sent again.</p> <p>*Mechanical operations (initializing the position of the printer head when the cover is opened, feeding paper by using the FEED button, etc.) cannot be executed from the beginning of the processing of this command till the finish of hardware reset.</p> <p>*NV bit image is a bit image which is defined in a non-volatile memory by FS q and can be printed by FS p.</p> <p>*This command is enabled only when processed at the beginning of a line in standard mode.</p> <p>*This command is invalid in page mode.</p> <p>*This command is effective when 7 bytes <FS ~yH> is processed as normal value.</p> <p>*If the amount of data exceeds the left capacity of the range defined by xL, xH, yL, yH, the printer processes xL, xH, yL, yH out of the defined range.</p> <p>*This command is invalid when the printer processes any of xL, xH, yL, yH out of the defined range in the first group of NV bit images</p> <p>*The printer stops processing this command and starts writing in to non-volatile memory when it processes xL, xH, yL, yH out of the defined range in groups of the following NV bit images than the first one. At this time, NV bit images which have been under defining are disabled(undefined), but NV bit images before which are enabled.</p> <p>*d is the defined data. A 1 bit specifies a dot to be printed and a 0 bit specifies a dot not to be printed.</p> <p>*This command defines n, the number of NV bit image which rises in order from NV bit image 01H. Thus, the first data group, [xL Xh yL yH d1...dk] is NV bit image 01H and the last data group [xL Xh yL yH d1...dk] is NV bit image n. This agrees with the number of NV bit images specified by FS p.</p> <p>*A defined data of a NV bit image consists of [xL Xh yL yH d1...dk]. Thus, when only one NV bit image is defined n=1, the printer processes a data group of [xL Xh yL yH d1...dk] once and uses $([data: (xL + xH \times 256) \times (yL + yH \times 256) \times 8] + [header: 4])$ bytes of non-volatile memory.</p> <p>*The definition area in this printer is a maximum 2M bits (256K bytes). This command can define several NV bit images but cannot define a bit image data whose total capacity [bit image data + data] exceeds 2M bytes (256K bytes).</p> <p>*The printer is BUSY before writing the data to NV user memory regardless of DIP switch setting [BUSY].</p> <p>*When this command is received during macro definition, the printer stops macro definition and begins to process this command.</p> <p>*Once a NV bit image is defined, is not initialized by executing ESC @, reset, power off.</p> <p>*This command executes only definition of a NV bit image and does not perform printing. Printing of NV bit image is executed by FS p.</p>

[CAUTION]

*Frequent command execution may cause damage the NV memory. Thus, it is strongly recommended to write the NV memory 10 times a day.

*The printer executes a hardware reset after finished writing to the NV memory. Thus, download characters, download bit images and macros should be undefined, the printer clears the receive buffer and initializes the mode to the mode that was effective at power on. At this time, DIP switch setting are read again.

*During processing this command, the printer may be BUSY when writing the data to the NV user memory. Thus, it is prohibited to transmit the data including the real time commands because this printer stops receiving data during the execution of this command.



(EXAMPLE) When $xL=64$, $xH=0$, $yL=96$, $yH=0$

FS r Read NV bit imageThis command is invalid.**FS ! Specify Kanji character print mode**

[FORMAT] <1C>H<21>H<n>

[RANGE] $0 \leq n \leq 255$

[FUNCTION] Specifies print mode for Kanji characters.

Bit	Function	Value	
		0	1
0	Undefined	-	-
1	Undefined	-	-
2	Double-width mode	OFF	ON
3	Double-height mode	OFF	ON
4	Undefined	-	-
5	Undefined	-	-
6	Undefined	-	-
7	Underline mode	OFF	ON

[CAUTION] *When both double-width (bit2 = 1) and double-height (bit3 = 1) modes are set, quadruple-size characters are printed.

*The printer can underline all characters including right and left side character spacing, **FS S**, but cannot underline the space set by Horizontal tab, **HT** and 90° clockwise rotated characters, **ESC V**.

*The thickness of the underline is specified by **FS -**, regardless of the character size.

*When some characters with double or more height are on a line, all the characters on the line are aligned at the baseline.

*When the size of character font is enlarged to the horizontal direction, it is enlarged to the right based on the left side of the character.

*The setting of the last received command is effective regarding printing modes which can be ON/OFF in other commands including character size or underline, etc. Thus, if the printer cancels double-width and double-height by **FS !** after specifies quadruple by **FS W**, it clears the setting of **FS W**.

[DEFAULT] n=0

FS & Specify Kanji character mode

[FORMAT] <1C>H<26>H

[RANGE] -

[FUNCTION] Specifies Kanji character mode.

[CAUTION] [For Japanese model]

*When the Kanji character mode is selected, the printer processes all the following data as two bytes code.

*Kanji codes are processed in the order of the first byte and second byte.

*Kanji character is off by default.

[For Chinese or Korean model]

*When the Kanji character mode is selected, the printer handles single and multi-byte Kanji correctly in the same text.

*Kanji codes are processed in the order of the first byte and second byte.

*Kanji character is off by default.

		The second byte														
		00H	20H	21H	7EH	7FH	A1H	FEH	FFH							
The first byte	00H	The control code which the first byte is effective is processed as the control code, and the following data is processed as Kanji with two bytes.														
	1FH	The first byte only is ignored if it is not the control code.														
	20H	Ignored	<table><tr><td>JIS level-1 Kanji set</td></tr><tr><td>Spacing undefined code</td></tr><tr><td>JIS level-2 Kanji set</td></tr><tr><td>Spacing undefined code</td></tr><tr><td>Spacing undefined code</td></tr><tr><td>Definition of external characters(spacing undefined code)</td></tr><tr><td>Spacing undefined code</td></tr></table>						JIS level-1 Kanji set	Spacing undefined code	JIS level-2 Kanji set	Spacing undefined code	Spacing undefined code	Definition of external characters(spacing undefined code)	Spacing undefined code	Ignored
	JIS level-1 Kanji set															
	Spacing undefined code															
	JIS level-2 Kanji set															
	Spacing undefined code															
	Spacing undefined code															
	Definition of external characters(spacing undefined code)															
	Spacing undefined code															
	21H															
	4FH															
	50H															
	73H															
74H																
76H																
77H																
78H																
7EH																
7FH	The first byte is processed as the control code and the following data are as Kanji data with two bytes.															
80H	<table><tr><td>Ignored</td><td>Kanji GB2312 / KS C 5601</td></tr></table>								Ignored	Kanji GB2312 / KS C 5601						
Ignored									Kanji GB2312 / KS C 5601							
A1H																
FEH																
FFH																

[DEFAULT] Kanji mode off (TH-80J, TH-80JN, TH-80C, TH-80CN, TH-80K, TH-80KN)

FS - Turn underline mode on/off for Kanji character

[FORMAT] <1C>H<2D>H<n>

[RANGE] $0 \leq n \leq 2, 48 \leq n \leq 50$

[FUNCTION] Turns underline mode on or off for Kanji characters.

<i>n</i>	Function
0,48	Turns off underline mode for Kanji characters.
1,49	Turns on underline mode for Kanji characters with 1 dot thick
2,50	Turns on underline mode for Kanji characters with 2 dot thick.

[CAUTION]

- *The printer can underline all characters including right and left side character spacing, **FS S**, but cannot underline the space set by horizontal tab, **HT** and 90° clockwise rotated characters, **ESC V**.
- *When the underline mode for Kanji characters is turned off by $n = 0$, the printer no longer underlines the data following but the previously specified underline thickness is stored. The default underline thickness is 1 dot.
- *The specified underline thickness does not change, regardless of the character size.
- *This command is not effective on ANK characters.
 - a: .Select print mode (**ESC !**)
 - b.: Turn underline mode on/off (**ESC -**)
- *It is possible to turn underline mode on or off by specifying Kanji character print mode, **FS !**, but the last received command is effective. Thus, if the printer turns off underline mode by **FS -** after turns on by **FS !**, it clears the setting of **FS !**.

FS . Turn Kanji character mode off

[FORMAT] <1C>H<2E>H

[RANGE] -

[FUNCTION] Turns Kanji character mode off.

[CAUTION] **[For Japanese model]**

*The printer processes all the following data as one byte code.

*Kanji character is off by default.

[For Chinese or Korea model]

*When Kanji character mode is off, all character codes are processed as single byte ASCII codes.

*Kanji character is on by default.

FS 2 Define download Kanji character

[FORMAT]	<1C>H<32>H<a1><a2>data1.....data72	24 X 24 dots
	<1C>H<32>H<a1><a2>data1.....data32	16 X 16 dots

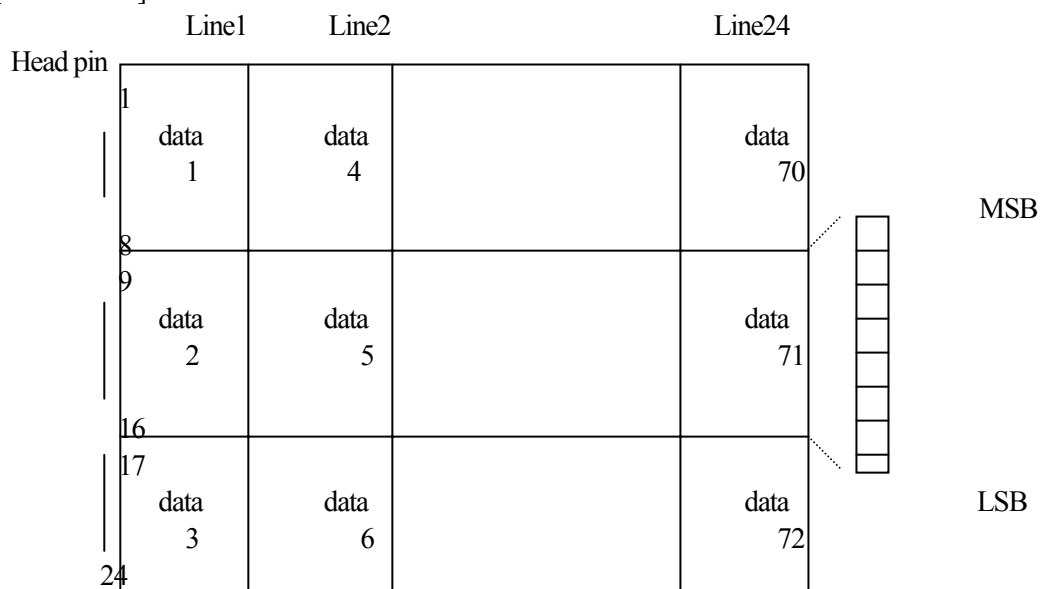
[RANGE]	Japanese Kanji (JIS)	a1=77H, 21H≤a2≤7EH
	Japanese Kanji (SHIFT-JIS)	a1=ECH, 40H≤a2≤7EH / 80H≤a2≤9EH
	Chinese Kanji (GB2312)	a1=FEH, A1H≤a2≤FEH
	Korea Kanji (KS C 5601)	a1=FEH, A1H≤a2≤FEH

[FUNCTION] Defines user-defined Kanji characters for the character code specified by a1, a2.

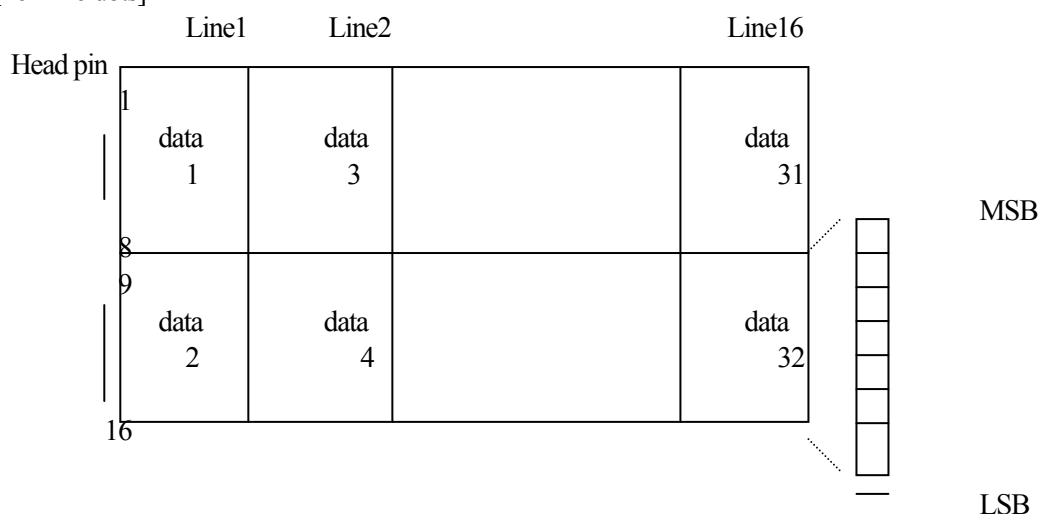
[CAUTION]

- *a1, a2 is the character codes for the defined characters. a1 specifies the first byte and a2 the second byte.
- *data1-data72(32 is the defined data. 1 specifies corresponding bit to print a dot and 0 not to print.
- *24 X 24 dots and 16 X 16 dots are distinguished by the selected font.
- *The data of download characters consists of 72 bytes or 16 bytes as follows.

[24 X 24 dots]



[16 X 16 dots]



*Character codes which can be recorded are 94 characters.

FS C Select Kanji character code system (Japanese model only)

[FORMAT] <1C>H<43>H<n>

[RANGE] n=0,1,48,49

[FUNCTION] Selects a Kanji character code system.

<i>n</i>	Selection
0,48	JIS code system
1,49	SHIFT JIS system

[DETAILS] *In the JIS code system, the available codes are as follows and this command is valid only on Japanese model.

The first byte: <21>H~<7E>H

The second byte : <21>H~<7E>H

*In the SHIFT JIS code system, the available codes are as follows.

The first byte: <81>H~<9F>H and <E0>H~<EF>H

The second byte : <40>H~<7E>H and <80>H~<FC>H

[CAUTION] *For Japanese model only.

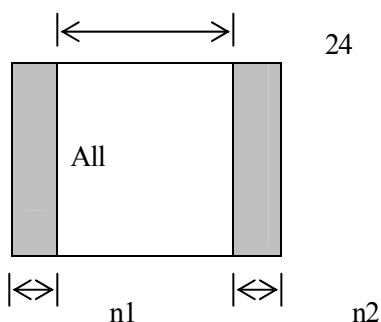
[DEFAULT] n=0

FS S Set the space amount of Kanji character

[FORMAT] <1C>H<53>H<n1><n2>

[RANGE] $0 \leq n1, n2 \leq 32$

[FUNCTION] Sets left (n1) and right (n2) side Kanji character spacing.



[CAUTION] *When double-width mode is set the left and right side character spacing is twice the normal value.

[DEFAULT] n1,n2=0

FS W Turn quadruple-size mode on/off for Kanji character

[FORMAT] <1C>H<57>H<n>

[RANGE] $0 \leq n \leq 255$ [FUNCTION] *Turns quadruple-size mode on or off for Kanji characters specified by *n*.

Bit	Function	Value	
		0	1
0	Quadruple character	OFF	ON
1	Undefined	-	-
2	Undefined	-	-
3	Undefined	-	-
4	Undefined	-	-
5	Undefined	-	-
6	Undefined	-	-
7	Undefined	-	-

[CAUTION] *Only the lowest bit *n* is valid

*Quadruple-size mode is the character which double-width and double-height modes are both selected at the same time.

*When quadruple-size mode is turned off by this command, the following character are printed in normal size.

*If some of the different characters in height are on a line, all the characters on the line are aligned at the baseline.

*When the size of the character is enlarged to the horizontal direction, it is enlarged to the right based on the left side of the character.

*The setting of the last received command is effective although **FS !** can turn on or off quadruple-size mode by selecting double-height and double-width modes. Thus, if the printer cancels quadruple-size mode by **FS W** after specifies quadruple by **FS !**, it clears the setting of **FS !**.**FS k Select Kanji character font(Japanese model only)**

[FORMAT] <1C>H<6B>H<n>

[RANGE] $0 \leq n \leq 1$ This command is invalid.[FUNCTION] *Selects Kanji character font specified by *n*.

Bit	Function	Value	
		0	1
0	Selects Kanji font	Mintyo	Gothic
1	Undefined	-	-
2	Undefined	-	-
3	Undefined	-	-
4	Undefined	-	-
5	Undefined	-	-
6	Undefined	-	-
7	Undefined	-	-

[CAUTION] *This command is ignored in the model with only one of the fonts.

*This command is valid only on Japanese models.

GS ! Select character size

[FORMAT] <1D>H<21>H<n>

[RANGE] $0 \leq n \leq FFH$

[FUNCTION] Selects the character size, height and width.

Bit	Function	Value
0	Character height selection	See table 2
1		
2		
3		
4	Character width selection	See table 1
5		
6		
7		

Table 1
Character width selection

Hex.	Width
00H	1(normal)
10H	2(double-width)
20H	3 times
30H	4 times
40H	5 times
50H	6 times
60H	7 times
70H	8 times

Table 2
Character height selection

Hex.	Height
00H	1 (normal)
01H	2(double-height)
02H	3 times
03H	4 times
04H	5 times
05H	6 times
06H	7 times
07H	8 times

- [DETAILES]
- *This command is effective for all characters (alphanumeric and Kanji) except for HRI characters.
 - *If height or width is out of the defined range, this command is ignored.
 - *In standard mode, the vertical direction is the paper feed direction and the horizontal direction is the perpendicular direction to the paper feed. Thus, when 90° clockwise rotation mode is selected, the relationship between vertical and horizontal direction is reversed.
 - *In page mode, the vertical and horizontal directions are based on the character.
 - *When the different sizes of characters are on one line, all the characters on the line are aligned at the baseline.
 - *The **ESC !** command can turn double-width and double-height modes on or off but the last received command is effective.

GS \$ Set absolute vertical print position in page mode

[FORMAT] <1D>H<24>H<nL><nH>

[RANGE] $0 \leq nL \leq 255$, $1 \leq nH \leq 255$ [FUNCTION] Sets the absolute vertical print position which is based on the starting position in page mode. The absolute print position is set to $[(nL + nH \times 256) \times (\text{horizontal or vertical motion unit})]$.

[CAUTION]

- *This command is valid only in page mode.
- *This command is ignored when the setting of the absolute print position exceeds the specified printing area.
- *The horizontal starting buffer position does not move.
- *The reference starting position is specified by **ESC T**.
- *This command operates as follows depending on the starting position specified by **ESC T**.
 - ① When the starting position is set to the upper left or lower right, this command sets the absolute print position to the vertical direction. In this case, the vertical motion unit, y , is used.
 - ② When the starting position is set to the upper right or lower left, this command sets the absolute print position to the horizontal direction. In this case, the horizontal motion unit, x , is used.
- *The horizontal and vertical motion unit are specified by **GS P**.
- *The calculated result is truncated to the minimum value of the mechanical pitch.

GS * Define download bit image

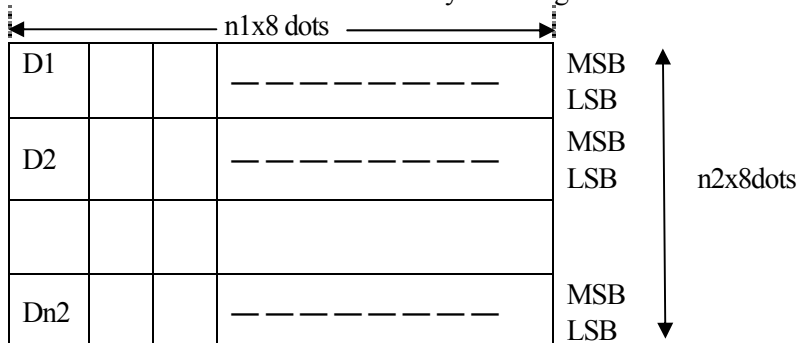
[FORMAT] <1D>H<2A>H<n1><n2><d1>...<dn>

[RANGE]

 $1 \leq n1 \leq 56$
 $1 \leq n2 \leq 48$
 $n1 \times n2 \leq 1344$
 $n = n1 \times n2 \times 8$
[FUNCTION] Defines a download bit image of the number of dots specified by $n1$ and $n2$.

[CAUTION]

- *The number of dots in the horizontal direction is $n1 \times 8$ and in the vertical direction is $n2 \times 8$.
- * d_n : Bit image data
- *The download bit image is effective until the printer is re-defined, initialized, reset or the power is turned off.
- *Both of the download bit image and download character cannot be defined at the same time. The defined download character is cleared by executing this command.



GS (A Execute test printing

[FORMAT] <1D>H<28>H<41>H<pL><pH><n><m>

[RANGE] (pL+(pH x256)=2 (pL=2、pH=0)
 $0 \leq n \leq 2$ 、 $48 \leq n \leq 50$
 $1 \leq m \leq 3$ 、 $49 \leq m \leq 51$

This command is invalid.

[FUNCTION] Executes a test print specified.
 *pL, pH specifies the number of the parameter as (pL+(pH x256) bytes.
 *n specifies the paper to be tested as follows.

n	Paper
0,48	Basic sheet (paper roll)
1,49	Paper roll
2,50	

*m specifies a test pattern as follows.

m	Test pattern
1,49	Hexadecimal dump
2,50	Printer status print
3,51	Rolling pattern print

[DETAILS] *This command is effective only when processed at the beginning of a line in standard mode.
 *This command is ignored in page mode.
 *When this command is received during macro definition, the printer stops macro definition and begins to process this command.
 *After the test print is finished, the printer resets the hardware automatically. Thus, the previously defined data such as the download characters, download bit image, and macro, becomes undefined and the receive buffer are cleared, and each setting returns to the default value. At this time, the printing re-reads the DIP switch setting.
 *The printer cuts the paper at the end of the test print.
 *The printer is BUSY when this command is started.

GS / Print download bit image

[FORMAT] <1D>H<2F>H<m>

[RANGE] $0 \leq m \leq 3$ 、 $48 \leq m \leq 51$

[FUNCTION] Prints download bit image specified by m..

m	Mode	Vertical dot density	Horizontal dot density
0,48	Normal	200dpi	200dpi
1,49	Double-width	200dpi	100dpi
2,50	Double-height	100dpi	200dpi
3,51	Quadruple	100dpi	100dpi

[CAUTION] *This command is ignored if there is any data in the print buffer.
 *This command is ignored if a download bit image has not been defined.
 *The download bit image exceeds the printable area is not printed.

GS : **Start/end macro definition**

[FORMAT] <1D>H<3A>H

[RANGE] -

[FUNCTION] Starts or ends macro definition.

[CAUTION] *Macro definition is useful when the same contents need to be printed several times.
 *Macro definition starts when this command is received during normal operation. Macro definition ends when this command is received during macro definition.
 *When **GS ^** is received during macro definition, the printer stops macro definition and clears the definition.
 *The default setting of macro is undefined.
 *The contents of the macro definition are not cleared by **ESC @**.
 *If the printer receives **GS :** again after receiving **GS :**, the macro definition returns to undefined state.

GS B **Turn white/black reverse printing mode on/off**

[FORMAT] <1D>H<42>H<n>

[RANGE] $0 \leq n \leq 255$

[FUNCTION] *Turns white/black reverse printing mode on or off.
 *When $n = \text{*****}0$, white/black reverse mode is turned off.
 *When $n = \text{*****}1$, white/black reverse mode is turned on.

[DETAILS] *Only the lowest bit of n is valid.
 *This command is effective for built-in characters and download characters.
 *This command is also applied to the right space amount of the character set by **ESC SP**.
 *This command does not affect bit image, download bit image, bar code, HRI characters and spacing skipped by **HT**, **ESC \$** and **ESC **.
 *This command does not affect the space between lines.
 *White/black reverse mode gives priority to underline mode. Thus, Even if underline mode is on, it is not underlined on the white/black reverse characters. But, the setting of underline mode is not cancelled.

[DEFAULT] $n=0$ **GS E** **Select printing speed**

[FORMAT] <1D>H<45>H<n>

[RANGE] $0 \leq n \leq 255$ This command is invalid.

[FUNCTION] Selects printing speed

Bit	Function	Value	
		0	1
0	Undefined	Fixed to 0	
1	Undefined	Fixed to 0	
2	Undefined	Fixed to 0	
3	Undefined	Fixed to 0	
4	Printing speed	High	Low
5	Undefined	Fixed to 0	
6	Undefined	Fixed to 0	
7	Undefined	Fixed to 0	

[CAUTION] This command is effective only when processed at the beginning of a line.

GS H Select printing position of HRI characters

[FORMAT] <1D>H<48>H<n>

[RANGE] $0 \leq n \leq 3$, $48 \leq n \leq 51$

[FUNCTION] *Selects the printing position of HRI characters when printing a bar code.

* $n = 0, 48$: Not printed.* $n = 1, 49$: Above the bar code.* $n = 2, 50$: Below the bar code.* $n = 3, 51$: Above and below the bar code.[DEFAULT] $n=0$ **GS I Transmit printer ID**

[FORMAT] <1D>H<49>H<n>

[RANGE] $1 \leq n \leq 3$, $49 \leq n \leq 51$ [FUNCTION] *Transmits the printer ID specified by n after executing this command.

n	Printer ID	Specification
1,49	Printer model ID	Depends on the model
2,50	Type ID	See below table
3,51	ROM version ID	Depends on the ROM version

*Type ID as follows.

Bit	Function	Value	
		0	1
0	Two byte character code	Not supported	Supported
1	Autocutter	Not equipped	Equipped
2	Undefined	Fixed to 0.	
3	Undefined	Fixed to 0.	
4	Undefined	Fixed to 0.	
5	Undefined	Fixed to 0.	
6	Undefined	Fixed to 0.	
7	Undefined	Fixed to 0.	

*When DTR/DSR control is selected, the printer transmits the printer ID after confirming that the HOST is ready to receive data. If the HOST is not ready to receive data, the printer waits until the HOST is ready.

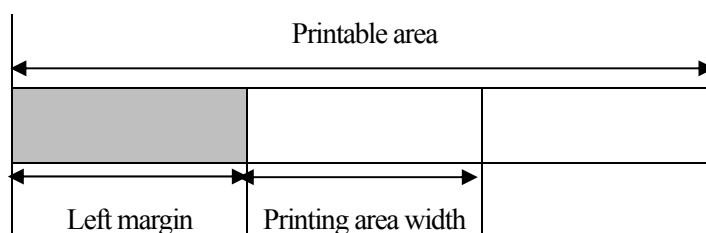
*XON/XOFF control is selected, the printer transmits the printer ID continuously without confirming that the HOST is ready to receive data.

GS L Sets left margin

[FORMAT] <1D>H<4C>H<nL><nH>

[RANGE] $0 \leq nL \leq 255$
 $0 \leq nH \leq 255$

[FUNCTION] *Sets the left margin specified by nL and nH.
 *The left margin is set to $[(nL + nH \times 256) \times \text{horizontal motion unit}]$.



[RANGE] *This command is effective only when processed at the beginning of a line in standard mode.
 *If this command is processed in page mode, the printer executes only internal flag operation.
 *The setting of this command does not affect printing in page mode.
 *The maximum left margin is the same area with the printable area in the horizontal direction. If the setting exceeds the printing area, the maximum value of the printable area is used.
 *The horizontal and vertical motion units are set by **GS P**. Even if the printer changes the horizontal and vertical motion unit by **GS P** after setting the left margin, the current left margin remains unchanged.
 *The horizontal motion unit (x) is used for calculation of the left margin. The calculated result is truncated to the minimum value of the mechanical pitch.

[DEFAULT] nL=0 、 nH=0

GS P Specify basic calculate pitch

- [FORMAT] <1D>H<50>H<x><y>
- [RANGE] $0 \leq x \leq 255$
 $0 \leq y \leq 255$
- [FUNCTION] *Specifies the horizontal and vertical motion units to approximately 25.4/xmm{(1/x) inches} and approximately 25.4/ymm{(1/y) inches}.
 *When x = 0, the default setting of horizontal motion unit is used.
 *When y = 0, the default setting of vertical motion unit is used.
- [DETAILS] *The horizontal direction is the perpendicular direction to the paper and the vertical direction is the paper feed direction.
 *The following commands are used, regardless of the character rotation (upside-down or 90° clockwise rotation), in standard mode.
 ① Commands using x: **ESC SP, ESC \$, ESC \ , FS S, GS L, GS W**
 ② Commands using y: **ESC 3, ESC J, GS V**
 *The following commands are used depending on the character orientation in page mode.
 ① When the print starting position is specified to the upper left or lower right by **ESC T** (data is buffered in the perpendicular direction to the paper feed direction.)
 *Commands using x: **ESC SP, ESC \$, ESC W, ESC \ , FS S**
 *Commands using y: **ESC 3, ESC J, ESC W, GS \$, GS \ , GS V**
 ② When the print starting position is specified to the upper right and the lower left by **ESC T**. (data is buffered in the paper feed direction.)
 *Commands using x: **ESC 3, ESC J, ESC W, GS \$, GS **
 *Commands using y: **ESC SP, ESC \$, ESC W, ESC \ , FS S, GS V**
 *This command does not affect the previously setting values.
 *The calculated result from combination width other commands is truncated to the minimum value of the mechanical pitch.
- [DEFAULT] x=180、 y=360

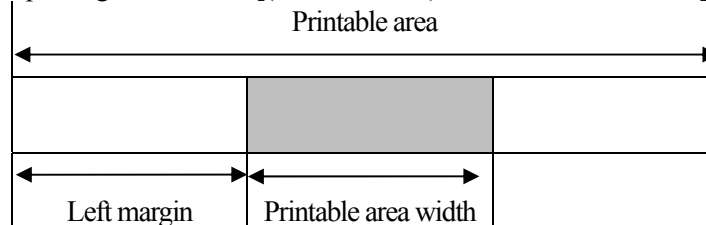
GS V Cut paper

- [FORMAT] <1D>H<56>H<m>
 <1D>H<56>H<m><n>
- [RANGE] $0 \leq m \leq 3, 48 \leq m \leq 51$
 $65 \leq m \leq 68, 0 \leq n \leq 255$
- [FUNCTION] Executes cutting paper specified as follows.
- | m | Function |
|---|---|
| | Full cut (one point left uncut) |
| | Feeds paper (cutting position + $n \times$ vertical motion unit) and cuts the paper fully (one point left uncut). |

- [CAUTION] *This command is effective only when processed at the beginning of a line.
 * Paper must be fed 3 mm after printing to prevent paper jam.

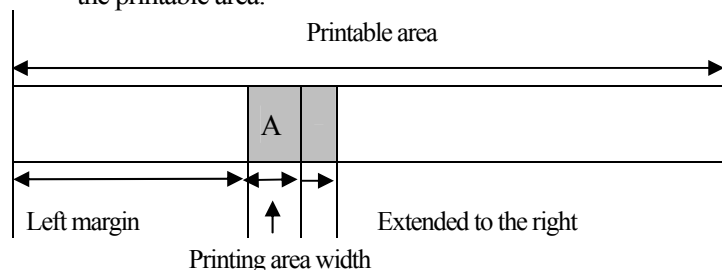
GS W Set printing area width

[FORMAT] <1D>H<57>H<nL><nH>

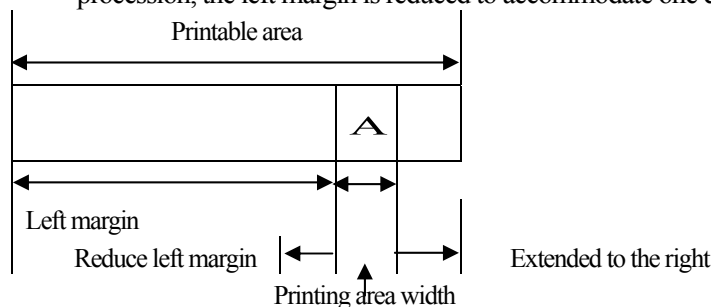
[RANGE] $0 \leq nL \leq 255$
 $0 \leq nH \leq 255$ [FUNCTION] *Sets the printing area width specified by nL, nH.
*The printing area width is $[(nL + nH \times 256) \times \text{horizontal motion unit}]$.

[FUNCTION] *This command is effective only when processed at the beginning of a line in standard mode.
 *This command executes only internal flag operations in page mode.
 *The setting of this command does not affect printing in page mode.
 *If the value exceeding the printable area is processed, printable area width except left margin is used.
 *The horizontal and vertical motion units are specified by **GS P**. Even if the printer changes the horizontal and vertical motion unit by **GS P** after setting the left margin, the current left margin remains unchanged.
 *The horizontal motion unit (x) by **GS P** is used for calculating the printing area width. The calculated result is truncated to the minimum value of the mechanical pitch.
 *If the width set for the printing area is less than the width of one character including the right space when the character data is developed at the beginning of a line, the following is processed only on the line in question.

The printing area width is extended to the right to accommodate one character, within the printable area.



If the printing area width cannot be extended sufficiently by executing procession, the left margin is reduced to accommodate one character.



If the printing area width cannot be extended sufficiently by executing , the right space is reduced.

*If the width set for the printing area is less than one line in horizontal, the following is processed only on the line in question when bit image is developed.

The printing area width is extended to the right to accommodate one line in horizontal for the bit image within the printable area.

If the printing area width cannot be extended sufficiently by executing , the left margin is reduced to accommodate on line in horizontal.

*The commands which execute the printing area width for bit image and its minimum width are as follows.

- *Bit image (**ESC ***): Single density mode = 2 dots / Double density mode = 1 dot
- *Download bit image (**GS /**): Double width or Quadruple mode = 2 dots
Normal or Double height mode = 1 dot
- *NV bit image mode (**FS p**): Double width or Quadruple mode = 2 dots
Normal or Double height mode = 1 dot
- *Raster bit image (**GS v 0**): Double width or Quadruple = 2 dots
Normal or Double height mode = 1 dot

[DEFAULT] nL = 64, nH = 2 (576)

GS \ Set relative vertical printing position in page mode

[FORMAT] <1D>H<5C>H<nL><nH>

[RANGE] $0 \leq nL \leq 255$
 $0 \leq nH \leq 255$

[FUNCTION] Sets relative vertical print starting position from the current position in page mode. The distance is set from the current position to $[(nL + nH \times 256) \times \text{vertical or horizontal motion unit}]$.

- [DETAILS]
- *This command is ignored except when page mode is selected.
 - *When pitch N is specified to the movement download (positive direction):
 $nL + nH \times 256$
When pitch N is specified to the movement upward (negative direction), use the complement of 65536. :
 $nL + nH \times 256 = 65536 - N$
 - *Any setting exceeds the specified printing area is ignored.
 - *The following commands are enabled depending on the starting position set by **ESC T**.
 - ① When the starting position is specified to the upper left or lower right of the printing, the vertical motion unit (y) is used
 - ② When the starting position is specified to the upper right or lower left of the printing, the horizontal motion unit (x) is used.
 - *The horizontal and vertical motion units are specified by **GS P**.
 - *The calculated result is truncated to the minimum value of the mechanical pitch.

GS ^ Execute macro

[FORMAT] <1D>H<5E>H<n1><n2><n3>

[RANGE] $0 \leq n1 \leq 255$
 $0 \leq n2 \leq 255$
 $0 \leq n3 \leq 1$

[FUNCTION] *Executes a macro.
 *n1 specifies the number of times to execute the macro.
 *n2 specifies the waiting time when the macro is executed.
 *n3 specifies macro executing mode.

n3	Function
0	The macro executes n1 times continuously at the interval specified by n2.
1	After waiting for the period specified by n2, the LED indicators blink and the printer waits for the manual feed button. After the button is pressed, the printer executes the macro once. The printer repeats this operation n1 times.

[CAUTION] *The macro definition is useful when the same contents need to be printed several times.
 *The waiting time is $n2 \times 100$ msec. after executing macro once.
 *If this command is received when a macro is being defined, the macro definition is stopped and the definition is cleared.
 *If the macro is not defined or $n1 = 0$, this command is ignored.
 *The macro is defined by transmitting **GS :** before and after the contents which should be repeated.

GS a Enable/disable Automatic Status Back

[FORMAT] <1D>H<61>H<n>

[RANGE] $0 \leq n \leq 255$

[FUNCTION] *Enable or disable Automatic Status Back (ASB) and select the status.

Bit	Status	Value	
		0	1
0	Drawer kick-out connector	Disabled	Enabled
1	Online/offline status	Disabled	Enabled
2	Error status	Disabled	Enabled
3	Paper roll sensor status	Disabled	Enabled
4	Undefined	-	-
5	Undefined	-	-
6	Undefined	-	-
7	Undefined	-	-

[CAUTION] *If any of the status in the table above are enabled, the printer transmits the status when this command is executed. The printer subsequently transmits the status automatically whenever the enabled status changes. In this case, the disabled status of ASB may change because each status transmission indicates the current status.

*If all the status are disabled, the ASB function is disabled.

*The following four status bytes are transmitted without confirming if the HOST is ready to receive data.

*The four status bytes must be continuous except the XOFF code.

*Because this command is executed after the data is processed in the print buffer, there may be a time lag between data reception and status transmission, depending on the receive buffer status.

*The following tables are the status which should be transmitted.

a: First byte (printer information)

Bit	Status	Value	
		0	1
0	Not used	Fixed to 0	
1	Not used	Fixed to 0	
2	Drawer kick-out connector(*1)	Low	High
3	Online/offline status	Online	Offline
4	Not used	Fixed to 1	
5	Cover status(*2)	Closed	Open
6	Paper feeding by the PAPER FEED button(*3)	Not feeding	Feeding
7	Not used.	Fixed to 0	

*1: Refer [CAUTION] e.

*2: Open by using cover open knob.

*3: The status is offline during paper feeding by the PAPER FEED button.

b: Second byte (error information)

Bit	Status	Value	
		0	1
0	Undefined	-	-
1	Undefined	-	-
2	Mechanical error	Not occurred	occurred
3	Undefined	-	-
4	Not used	Fixed to 0	
5	Unrecoverable error	Not occurred	occurred
6	Head temperature error	Not occurred	occurred
7	Not used	Fixed to 0	

c: Third byte (paper sensor information)

Bit	Status	Value	
		0	1
0	Paper roll near-end sensor	Paper enough	Paper near end
1	Paper roll near-end sensor	Paper enough	Paper near end
2	Paper roll end sensor	Paper present	Paper not present
3	Paper roll end sensor	Paper present	Paper not present
4	Not used	Fixed to 0	
5	Not used	Fixed to 0	
6	Not used	Fixed to 0	
7	Not used	Fixed to 0	

*Bit 0 and 1 are valid only on near-end sensor model.

d: Fourth byte (paper sensor information)

Bit	Status	Value	
		0	1
0	Not used	Fixed to 0	
1	Not used	Fixed to 0	
2	Not used	Fixed to 0	
3	Not used	Fixed to 0	
4	Not used	Fixed to 0	
5	Not used	Fixed to 0	
6	Not used	Fixed to 0	
7	Not used	Fixed to 0	

e: About setting of the drawer sensor.

If two drawers are connected, DIWSW should be specified depending on the relationship between the drawer and the drawer sensor.

①Drawer is opened and sensor is low: DIPSW-9 : OFF

②Drawer is opened and sensor is high: DIPSW-9 : ON

When the drawer open is high, the open status of plug 2 cannot be confirmed until the plug 2 is opened if the printer is turned on with the plug 2 opened.

[DEFAULT]

n = 0

GS b Turn smoothing mode on/off

[FORMAT] <1D>H<62>H<n>

[RANGE] $0 \leq n \leq 255$ This command is invalid.

[FUNCTION] Turns smoothing mode on or off.
 When $n = \text{<*****0>B}$, smoothing mode is turned off.
 When $n = \text{<*****1>B}$, smoothing mode is turned on.

[DETAILS] *Only the lowest bit of n is effective.
 *Smoothing mode is available for built-in, download characters.
 *Even if smoothing mode is turned on, smoothing is not processed when each of character width or character height is the normal size.

[DEFAULT] $n=0$ **GS f Select font for HRI characters**

[FORMAT] <1D>H<66>H<n>

[RANGE] $0 \leq n \leq 1H$
 $30 \leq n \leq 31H$

[FUNCTION] Selects a font for the HRI characters when printing a bar code.
 $n = 0, 30H$: font A
 $n = 1, 31H$: font B

[CAUTION] *HRI is Human Readable Interpretation.
 *HRI characters are printed at the position specified by **GS H**.

[DEFAULT] $n=0$ **GS h Select bar code height**

[FORMAT] <1D>H<68>H<n>

[RANGE] $1 \leq n \leq 255$

[FUNCTION] Selects the bar code height.
 * n = the number of dots in the vertical direction.

[DEFAULT] $n=162$

GS k Print bar code

[FORMAT] <1D>H<6B>H<m><d1>...<dk><00>H
 <1D>H<6B>H<m><n><d1>...<dn>

[RANGE] $0 \leq m \leq 6$
 $65 \leq m \leq 72$

[FUNCTION] Selects a bar code system and prints the bar code.

m	Bar code system	Number of characters(k)	Defined range of d
0	UPC-A	$11 \leq k \leq 12$	$30H \leq d \leq 39H$
1	UPC-E	$11 \leq k \leq 12$	$30H \leq d \leq 39H$
2	JAN13(EAN13)	$12 \leq k \leq 13$	$30H \leq d \leq 39H$
3	JAN8(EAN8)	$7 \leq k \leq 8$	$30H \leq d \leq 39H$
4	Code39	$1 \leq k$	English capital, numerical symbols
5	Interleaved 2 of 5(ITF)	$1 \leq k$	$30h \leq d \leq 39h$
6	Codabar	$1 \leq k$	Numerical numbers, ABCD

*This command ends with NUL code.

m	Bar code system	Number of characters(n)	Defined range of d
65	UPC-A	$11 \leq n \leq 12$	$30H \leq d \leq 39H$
66	UPC-E	$11 \leq n \leq 12$	$30H \leq d \leq 39H$
67	JAN13(EAN13)	$12 \leq n \leq 13$	$30H \leq d \leq 39H$
68	JAN8(EAN8)	$7 \leq n \leq 8$	$30H \leq d \leq 39H$
69	Code39	$1 \leq n$	English capital, numerical symbols
70	Interleaved 2 of 5(ITF)	$1 \leq n$	$30h \leq d \leq 39h$
71	Codabar	$1 \leq n$	Numerical symbols, ABCD
72	Code93	$1 \leq n$	$0 \leq 127$
73	Code128	$1 \leq n$	$0 \leq 127$

GS r Transmit status

[FORMAT] <1D>H<72>H<n>

[RANGE] $1 \leq n \leq 2, 49 \leq n \leq 50$ [FUNCTION] *Transmits the status specified by n .

n	Function
1,49	Transmits paper sensor status
2,50	Transmits drawer open sensor status

*The status which should be transmitted as follows.

a: $n = 1$ (paper sensor status)

Bit	Status	Value	
		0	1
0	Paper roll near-end sensor	Paper enough	Paper near end
1		Paper enough	Paper near end
2	Paper roll end sensor	Paper enough	Paper near end
3		Paper enough	Paper near end
4	Not used	Fixed to 0	
5	Not defined	-	-
6	Not defined	-	-
7	Not used	Fixed to 0	

*Bit 0 and 1 are valid only on near-end sensor model.

b: $n = 2$ (drawer kick-out connector status)

Bit	Status	Value	
		0	1
0	Drawer kick-out connector pin 3	Low	High
1	Not defined	-	-
2	Not defined	-	-
3	Not defined	-	-
4	Not used	Fixed to 0	
5	Not defined	-	-
6	Not defined	-	-
7	Not used	Fixed to 0	

[CAUTION]

*When DTR/DSR control is selected, the printer transmits the status after the HOST is ready to receive data. Thus, the printer waits until the HOST is ready if the HOST is not to receive data.

*XON/XOFF control is selected, the printer transmits the status without confirming if the HOST is ready to receive data.

*This command is executed when the print buffer is developed. Thus, there may be time a time lag between receiving the command or transmitting the status depending on the receive buffer status.

*This command is ignored if n is out of defined range.

GS v 0 Print raster bit image

[FORMAT] <1D>H<76>H<30>H<m><xL><xH><yL><yH>[d1...dk]

[RANGE] $0 \leq m \leq 3, 48 \leq m \leq 51$
 $0 \leq xL \leq 255$
 $0 \leq xH \leq 255$
 $0 \leq yL \leq 255$
 $0 \leq yH \leq 8$
 $0 \leq d \leq 255$
 $k = (xL + xH \times 256) \times (yL + yH \times 256) \quad (k \neq 0)$

[FUNCTION] Prints raster bit image specified by mode *m*.

m	Mode	Vertical dot density	Horizontal dot density
0,48	Normal	200dpi	200dpi
1,49	Double-width	200dpi	100dpi
2,50	Double-height	100dpi	200dpi
3,51	Quadruple	100dpi	100dpi

*xL, xH specifies the number of data (xL+xH x256) bytes in the horizontal direction for the bit image

*yL, yH specifies the number of data (yL+yH x256) bytes in the vertical direction for the bit image.

[DETAILES]

*This command is effective only when there is no data in the print buffer in standard mode.

*This command does not affect all printing modes (character size, emphasized character, double-strike, upside-down, underline, white/black reverse printing mode, etc.) for raster bit image.

*If the printing area width specified by **GS L**, **GS W** is less than the minimum width, the printing area is extended to the minimum width only on the line in question. The minimum width is 1 dot in normal mode (m = 1,49) and double-height mode (m = 2,50), and 2 dots in double-width mode (m = 1,49) and quadruple mode (m = 3,51).

*Data outside the printing area is read in and discarded in increments of a dot.

*The position which characters should be printed for raster bit image is specified by **HT** (horizontal Tab), **ESC \$** (Set absolute print position), **ESC ** (Set relative print position) and **GS L** (Set left margin). If the position which characters should be printed is not a multiple of 8, printing speed may decline.

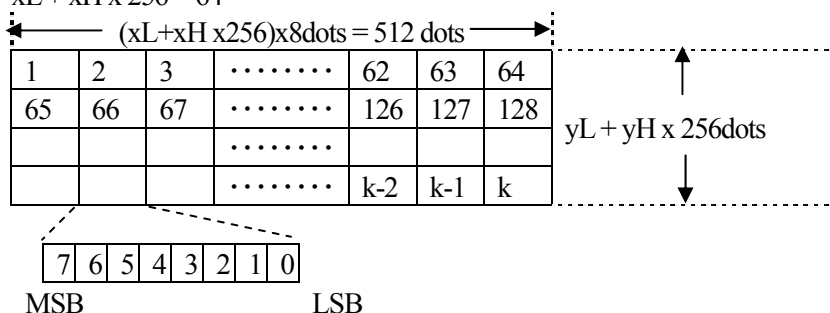
*The **ESC a** (Select justification) setting is also available for raster bit images.

*When this command is received during macro definition, the printer stops macro definition and begins to process this command. At this time, the macro is not defined.

*d indicates the defined data. The setting 1 is a bit to print a dot and the setting 0 is a bit not to print a dot.

【Example】

$$xL + xH \times 256 = 64$$



GS w Select bar code width

[FORMAT] <1D>H<77>H<n>

[RANGE] $2 \leq n \leq 4$

This command is invalid.

[FUNCTION] Sets the horizontal size of the bar code to dot n .

[DEFAULT] $n=3$

APPENDIX A DIP SWITCH

SETTING & CHECKING THE DIP SWITCHES

No.	CONTENTS	STATUS				STATUS			
1	Reset By Dtr Signals	Off	Invalid			On	Valid		
2	(Reserved)	Off	(Fixed to OFF)				(Fixed to OFF)		
3	Protocol	Off	XON/XOFF			On	DTR/DSR		
4	Baud Rate	Off	9600			On	19200		
5	Parity	Off	Non	Off	Even	On	Non	On	Odd
6		Off		On		On		Off	
7	Data Length	Off	8bits			On	7bits		
8	Busy	Off	Bufferful			On	Bufferful/Offline		
9	Reversed	Off	Fixed to Off				Fixed to Off		
10	Carriage Return	Off	Valid			On	Invalid		

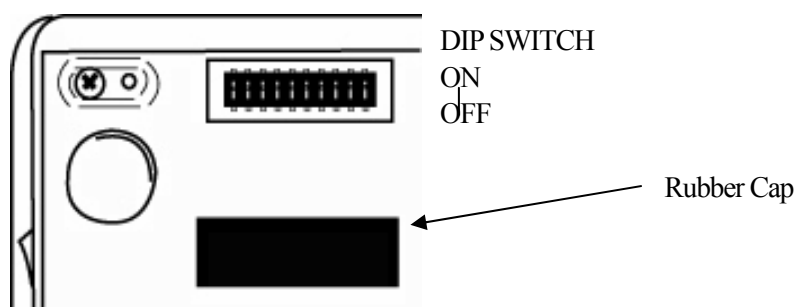
Before changing DIP switch setting

- 1: Make sure that Power of the printer is turned off.
- 2: Remove the rubber cap at the bottom of the printer.
- 3: Change the status of DIP switch by using something with a point.
- 4: Cover the DIP switch with the rubber cap.

CAUTION

The new status becomes effective when the printer power is turned on.

DIP SWITCH POSITION



APPENDIX B FIRMWARE DOWNLOAD

The following steps can help you to download programs for both TH-80 series.

Download TH82 Series Program

1: FILE

Confirm that you have the following files.

Copy2Com.exe	Program for the download
TH80xxxx.hex	Program file. xxxx depends on the version NO. Ex: "TH82EPS108.hex"
readme.txt	contains this text, APPENDIX B . Check the "readme.txt" for last minute changes.

2: DIPSW setting

Turn the printer off, set dip switch 2 on, then turn the printer on.

If dip switch 2 is already set to on, it is not necessary to turn off the power.

3: Activation of Copy2Com.exe

Select COM port from the Startup(S) menu. Default setting is COM1.

Communication settings for downloading the TH82 program are 38400BPS, NON PARITY and 8BIT. Change the setting of COM port and Speed. Then, click "OpenCom" from the File(F) menu.

4: Selection of the file and transmission

Select the file to be transmitted (ie. TH82xxxx.hex) using the DRIVE LIST BOX, DIRECTORY LIST BOX and FILE LIST BOX. The selected file name is displayed below the boxes. Click the "SEND" button to start transmission.

5: Display on the TH82

Two LEDs of the operation panel shows the status as follows.

*Standby	ERROR and ON-LINE LED buttons blink alternately at every few seconds.
*During the data is received	Blinking speed doubles the standby mode.
*Result of the download	If the download is successful, ERROR and ONLINE LED buttons blink at the ratio of 3:1. If error occurred, ERROR LED button blinks longer at the reverse ratio, 1:3. In case of that, execute power cycle. After terminated the download, the printer and DIPSW-2 are turned off.

NOTE: If an error occurred in receiving and writing, one of the following codes is displayed.

In receiving Hex file:

44	Line To Long
45	Format error
46	Check Sum error
47	Command error

In writing to FlashRom

30	Chip Erase error
31	Write error
32	Verify (Read after write) error